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A UNIVERSITY OF  
**MARYLAND**  
PUBLICATION

Volume 3    FEBRUARY 28, 1951    Number 16

**GRADUATE SCHOOL  
ANNOUNCEMENTS**  
**ISSUE 1951-1952**



**UNIVERSITY OF MARYLAND**  
College Park, Maryland

## IMPORTANT

THE provisions of this publication are not to be regarded as an irrevocable contract between the student and the University of Maryland. The University reserves the right to change any provision or requirement at any time within the student's term of residence. The University further reserves the right at any time, to ask a student to withdraw when it considers such action to be in the best interests of the University.

## GENERAL INFORMATION

For information in reference to the University grounds, buildings, equipment, library facilities, requirements in American Civilization, definition of resident and non-resident, regulation of studies, degrees and certificates, transcripts of records, student health and welfare, living arrangements in the dormitories, off-campus housing, meals, University Counseling Service, scholarships and student aid, athletics and recreation, student government, honors and awards, religious denominational clubs, fraternities, societies and special clubs, the University band, student publications, University Post Office and Supply Store, write to the Director of Publications for the General Information issue of the Catalog.

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Volume 3

FEBRUARY 28, 1951

Number 16

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### A UNIVERSITY OF MARYLAND PUBLICATION

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Edited by Harvey L. Miller, Director of Publications, University of Maryland.

# BOARD OF REGENTS

AND

## MARYLAND STATE BOARD OF AGRICULTURE

*Term  
Expires*

WILLIAM P. COLE, JR., Chairman, 100 West University Parkway, Baltimore .....	1958
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E. PAUL KNOTTS, Denton, Caroline County.....	1954
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Members of the Board are appointed by the Governor of the State for terms of nine years each, beginning the first Monday in June.

The President of the University of Maryland is, by law, Executive Officer of the Board.

The State law provides that the Board of Regents of the University of Maryland shall constitute the Maryland State Board of Agriculture.

A regular meeting of the Board is held the last Friday in each month, except during the months of July and August.

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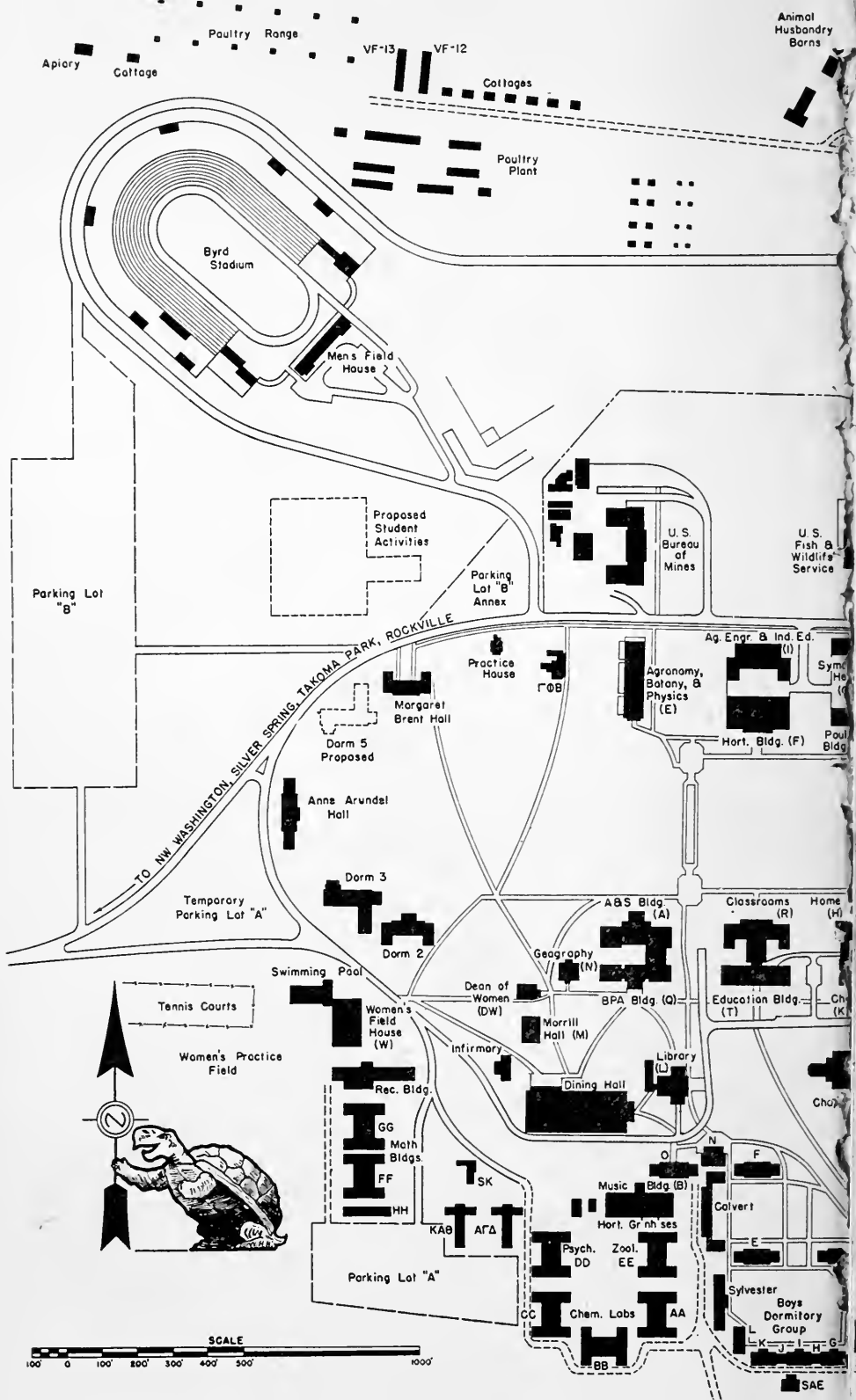
CHAIRMAN SHREEVE; MESSRS. DAIKER, GEWEHR, HAMILTON, RANDALL, REID, SCOTT, WHITE; MMES. BRYAN, MCNAUGHTON.

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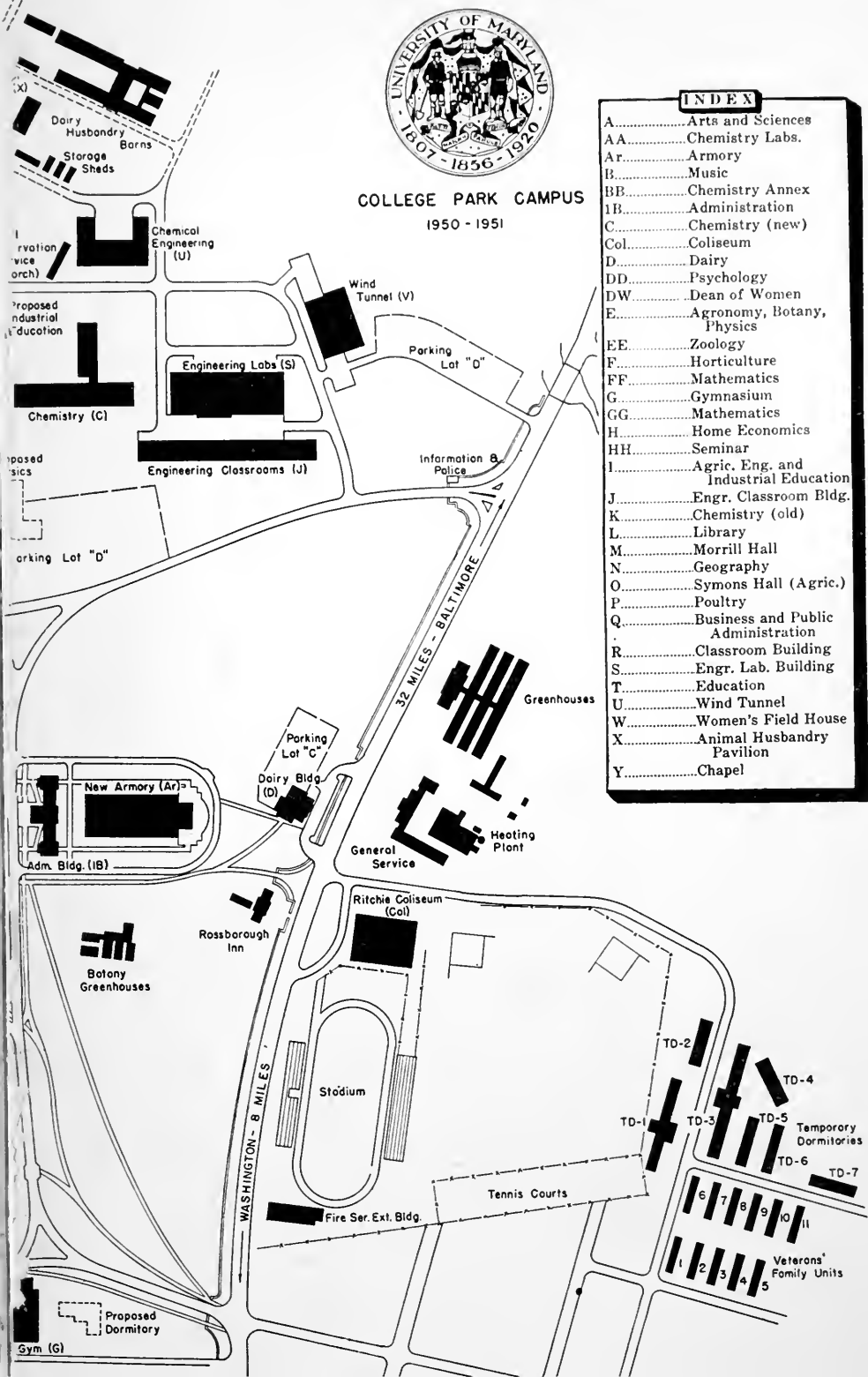






## COLLEGE PARK CAMPUS

1950 - 1951



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# 1951

JULY							AUGUST							SEPTEMBER							OCTOBER							NOVEMBER							DECEMBER							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
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# 1952

JANUARY							FEBRUARY							MARCH							APRIL							MAY							JUNE							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
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JULY							AUGUST							SEPTEMBER							OCTOBER							NOVEMBER							DECEMBER							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
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# 1953

JANUARY							FEBRUARY							MARCH							APRIL							MAY							JUNE							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
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EASTER SUNDAYS: March 25, 1951; April 13, 1952; April 5, 1953.

## CALENDAR — 1951-1952

### COLLEGE PARK

### First Semester

September 18-21	Tuesday-Friday	Registration, first semester
September 24	Monday	Instruction begins
October 18	Thursday	Convocation, faculty and students
November 21	Wednesday after last class	Thanksgiving recess begins
November 26	Monday, 8 a. m.	Thanksgiving recess ends
December 20	Thursday after last class	Christmas recess begins

### 1952

January 3	Thursday, 8 a. m.	Christmas recess ends
January 20	Sunday	Charter Day
January 23-30	Wednesday-Wednesday, inc.	First semester examinations

### Second Semester

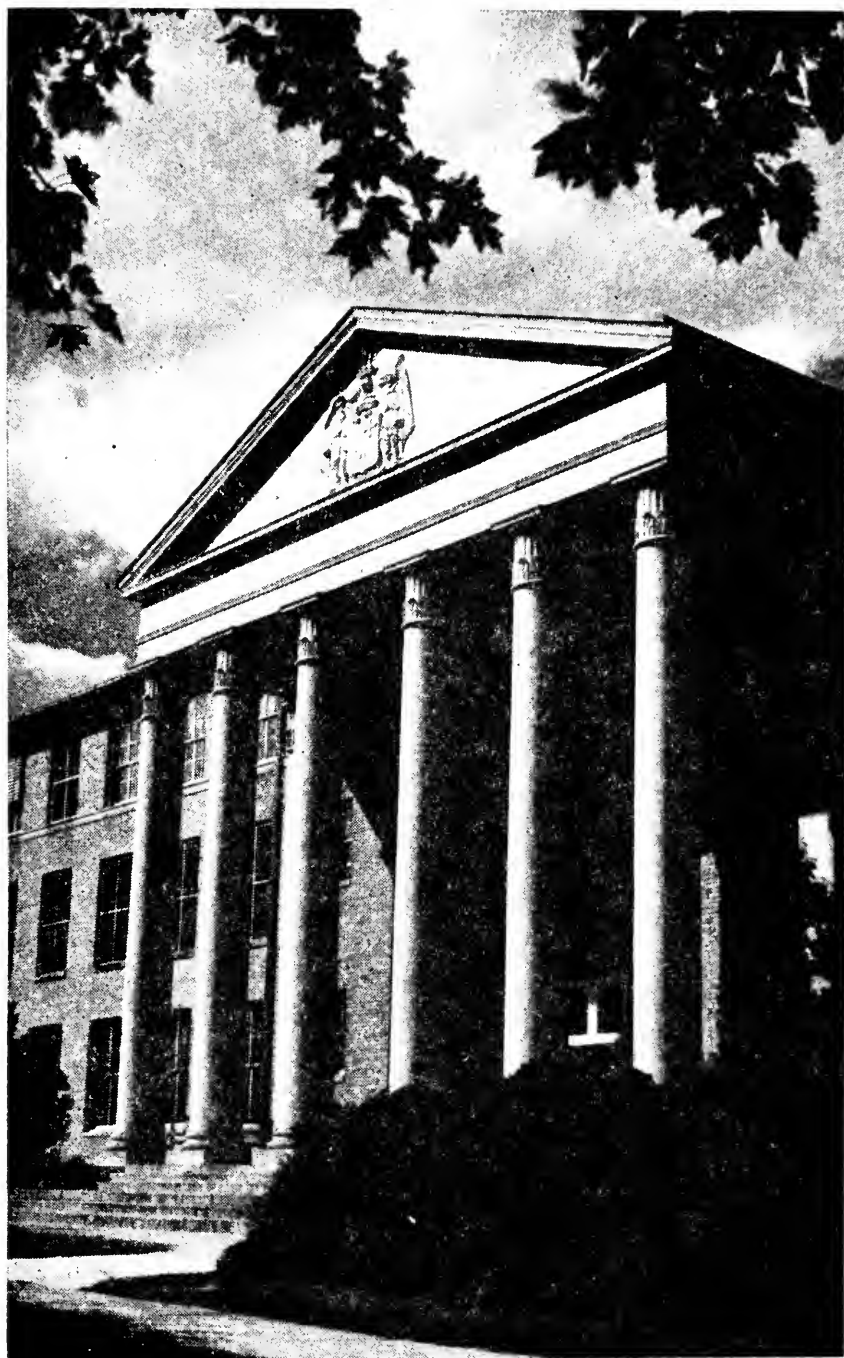
February 5-8	Tuesday-Friday	Registration, second semester
February 11	Monday	Instruction begins
February 22	Friday	Washington's Birthday, holiday
March 25	Tuesday	Maryland Day
April 10	Thursday after last class	Easter recess begins
April 15	Tuesday, 8 a. m.	Easter recess ends
May 15	Thursday	Military Day
May 30	Friday	Memorial Day, holiday
May 29-June 6	Thursday-Friday, inc.	Second semester examinations
June 1	Sunday	Baccalaureate exercises
June 7	Saturday	Commencement exercises

### Summer Session, 1952

June 23	Monday	Registration, summer session
June 24	Tuesday	Summer session begins
August 1	Friday	Summer session ends

### Short Courses

June 16-21	Monday-Saturday	Rural Women's Short Course
July 8-11	Tuesday-Friday	Maryland Congress of Parents and Teachers
August 4-9	Monday-Saturday	4-H Club Week
September 2-5	Tuesday-Friday	Firemen's Short Course



Entrance to Graduate School Building

# GRADUATE SCHOOL ANNOUNCEMENTS 1951-1952

## THE GRADUATE COUNCIL

H. C. BYRD, LL.D., D.Sc., President of the University

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C. O. APPLEMAN, Ph.D., Dean Emeritus

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E. N. CORY, Ph.D., Professor of Entomology

HAROLD F. COTTERMAN, Ph.D., Professor of Agricultural Education

N. L. DRAKE, Ph.D., Professor of Organic Chemistry

NOEL E. FOSS, Ph.D., Professor of Pharmacy (Baltimore)

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HAROLD C. HOFFSOMMER, Ph.D., Professor of Sociology

W. B. KEMP, Ph.D., Director of Agricultural Experiment Station Emeritus

M. MARIE MOUNT, M.A., Professor of Home and Institution Management

J. FREEMAN PYLE, Ph.D., Professor of Economics and Marketing

JOSEPH M. RAY, Ph.D., Professor of Government and Politics

LEON P. SMITH, Ph.D., Professor of Foreign Languages

EDUARD UHLENHUTH, Ph.D., Professor of Gross Anatomy (Baltimore)

E. G. VANDEN BOSCHE, Ph.D., Professor of Biochemistry (Baltimore)

A. E. ZUCKER, Ph.D., Professor of Foreign Languages

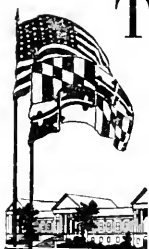
## GRADUATE SCHOOL SUPPLEMENT TO GENERAL CALENDAR

## 1951

October 2	Tuesday	Modern language examination for Ph.D. requirement
October 13	Saturday	Last day to file applications for admission to candidacy for Doctor's degree at 1952 Commencement

## 1952

January 12	Saturday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on January 30, 1952
February 12	Tuesday	Modern language examination for Ph.D. requirement
February 16	Saturday	Last day to file applications for admission to candidacy for Master's degree at 1952 Commencement
May 10	Saturday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on June 7, 1952
June 3	Tuesday	Modern language examination for Ph.D. requirement
June 7	Saturday	Last day to file applications for admission to candidacy at June meeting of the Graduate Council
July 12	Saturday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on August 1, 1952

**GRADUATE FACULTY**RONALD BAMFORD, Ph.D., *Dean*

THE faculty of the Graduate School is made up of those members of the faculties of the various colleges who give instruction in approved graduate courses. The general administrative functions of the graduate faculty are delegated to the Graduate Council.

**GENERAL INFORMATION****HISTORY AND ORGANIZATION**

In the earlier years of the institution the Master's degree was frequently conferred, but the work of the graduate students was in charge of the departments concerned, under the supervision of the general faculty. The Graduate School of the University of Maryland was established in 1918, and organized graduate instruction leading to both the Master's and the Doctor's degree was undertaken. At this time the Graduate Council was organized with the Dean of the Graduate School as chairman. The Graduate Council meets regularly in March, June and October to consider all matters relating to graduate work. It may also be called for special meetings throughout the year if urgent business must be transacted.

**LOCATION**

The University of Maryland is located at College Park, in Prince George's County, Maryland, on the Baltimore and Ohio Railroad, eight miles from Washington and thirty-two miles from Baltimore. Washington, with its wealth of resources, is easily accessible by train, street car and bus.

The professional schools of Medicine, Nursing, Pharmacy, Dentistry and Law are located in Baltimore, at the corner of Lombard and Greene Streets. The office of the Graduate School is located on the second floor of the Education Building on the College Park campus.

**LIBRARIES**

In addition to the resources of the University libraries the great libraries of the national capital are easily available for reference work. Because of the proximity of these libraries to College Park, they are a valuable asset to research and graduate work at the University of Maryland.

**MISCELLANEOUS INFORMATION**

For information in reference to the University grounds, buildings, equipment, transcripts of records, off-campus housing, meals, athletics and recreation, religious denominational clubs, fraternities, sororities, societies and special clubs, student publications, University supply store, write to the Director of Publications for the General Information Issue of the Catalog.

## GENERAL REGULATIONS

### ADMISSION

An applicant for admission to the Graduate School must hold a bachelor's or a Master's degree from a college or university of recognized standing. The applicant shall furnish an official transcript of his collegiate record which for unconditional admission must show creditable completion of an adequate amount of undergraduate preparation for graduate work in his chosen field. Application for admission to the Graduate School should be made prior to dates of registration on blanks obtained from the office of the Dean.

After approval of the application a matriculation card, signed by the Dean, is issued to the student. This card permits one to register in the Graduate School. It is his certificate of membership in the Graduate School and should be retained by the student to present at each succeeding registration.

Admission to the Graduate School does not necessarily imply admission to candidacy for an advanced degree.

### REGISTRATION

All students pursuing graduate work in the University, even though they are not candidates for higher degrees, are required to register in the Graduate School at the beginning of each session. *In no case will graduate credit be given unless the student matriculates and registers in the Graduate School.* This applies especially to those students who register through the College of Special and Continuation Studies at locations away from the campus.

The program of work for each session is arranged by the student with the major department and entered upon two course cards, which are signed first by the professor in charge of the student's major subject and then by the Dean of the Graduate School. One card is retained by the Dean. The student takes the other card, and in case of a new student, also the matriculation card, to the Registrar's office, where the registration is completed. Students will not be admitted to graduate courses until the Registrar has certified to the instructor that registration has been completed. Course cards may be obtained at the Registrar's office or at the Dean's office. The heads of departments usually keep a supply of these cards in their respective offices.

A time schedule, supplementing this catalog, is issued shortly before the beginning of each semester, showing the hours and location of class meetings. This schedule is available at the office of the Graduate School, or the office of the Registrar.

### GRADUATE COURSES

Graduate students must elect for credit in partial fulfillment of the requirements for higher degrees only courses designated *For Graduates* or

*For Graduates and Advanced Graduates.* Students who are inadequately prepared for graduate work in their chosen fields or who lack prerequisites for minor courses may elect a limited number of courses numbered from 1 to 99 in the general catalogue, but graduate credit will not be allowed for these courses. Courses that are audited are registered for in the same way as other courses, and the fees are the same.

### PROGRAM OF WORK

The professor who is selected to direct a student's thesis work is the student's adviser in the formulation of a graduate program, including suitable minor work, which is arranged in cooperation with the instructors. To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions are limited to a program of fifteen credit hours per semester. If a student is preparing a theses during the minimum residence for the master's degree, the registration in graduate courses should not exceed twelve hours for the semester.

### SUMMER SESSION

The University conducts a six-weeks summer session at College Park, with a comprehensive undergraduate and graduate program. The University publishes a separate bulletin giving full information on this summer session. This bulletin is available upon application to the Director of the Summer Session, University of Maryland, College Park.

### GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

Graduate courses and opportunities for research are offered in the professional schools at Baltimore. Students pursuing graduate work in the professional schools must register in the Graduate School, and meet the same requirements and proceed in the same way, as do graduate students in other departments of the University.

### GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

A senior of this University who has nearly completed the requirements for the undergraduate degree may, with the approval of his undergraduate dean and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which may later be transferred for graduate credit toward an advanced degree at this University, but the total of undergraduate and graduate courses must not exceed fifteen credits for the semester. Excess credits in the senior year cannot later be used for graduate credit unless such pre-arrangement is made. Seniors who wish to register for graduate credit should apply to the Dean of the Graduate School for information about procedure.

### ADMISSION TO CANDIDACY FOR ADVANCED DEGREES

Application for admission to candidacy for the Master's and for the Doctor's degree is made on application blanks which are obtained at the office of the Dean of the Graduate School. These are filled out in duplicate



by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. All applications for admission to candidacy must be approved by the Graduate Council.

Admission to candidacy in no case assures the student of a degree, but merely signifies he has met all the formal requirements and is considered by his instructors sufficiently prepared and able to pursue such graduate study and research as are demanded by the requirements of the degree sought. The candidate must show superior scholarship in graduate work already completed.

Application for admission to candidacy is made at the time stated in the sections dealing with the requirements for the degree sought.

### REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

**Advancement to Candidacy.** Each prospective candidate for the Master's degree is required to make application for admission to candidacy not later than the date on the calendar for the semester in which the degree is sought. He must have completed at least twelve semester hours of graduate work at the University of Maryland. An average grade of "B" in all major and minor subjects is required.

**Minimum Residence.** A residence of at least two semesters, or equivalent, at this institution, is required.

**Course Requirements.** A minimum of twenty-four semester hours, exclusive of thesis and registration for research, with an average grade of "B" in courses approved for graduate credit, is required for the degrees of Master of Arts and Master of Science. At the option of the major department concerned, the student may be required also to register for a maximum of six semester hours for research and thesis work. The total number of credit hours required for the degree would then be thirty. If the student is inadequately prepared for the required graduate courses, either in the major or minor subjects, additional courses may be required to supplement the undergraduate work. Of the twenty-four hours required in graduate courses, not less than twelve hours and not more than sixteen semester hours must be earned in the major subject. The remaining credits must be outside the major subject and must comprise a group of coherent courses intended to supplement and support the major work. Not less than one-half of the total required course credits for the degree, or a minimum of twelve, must be selected from courses numbered 200 or above. No credit for the degree of Master of Arts or Master of Science may be obtained for correspondence courses. The entire course of study must constitute a unified program approved by the student's major adviser and by the Dean of the Graduate School.

**Transfer of Credit.** Credit not to exceed six semester hours, obtained at other recognized institutions, may be transferred and applied to the

course requirements of the Master's degree, provided that the work was of graduate character, and provided that it is approved for inclusion in the student's graduate program at the University of Maryland. This transfer of credit is submitted to the Graduate Council for approval when the student applies for admission to candidacy for the degree. Acceptance of the transferred credits does not reduce the minimum residence requirement. The candidate is subject to final examination by this institution in all work offered for the degree.

**Thesis.** In addition to the twenty-four semester hours in graduate courses, a satisfactory thesis is required of all candidates for the degrees of Master of Arts and Master of Science. (Exceptions may be made in the cases of candidates for the degree of Master of Arts in American Civilization. See page 15.) The thesis must demonstrate the student's ability to do independent work and it must be acceptable in literary style and composition. With the approval of the student's major professor and the Dean of the Graduate School, the thesis in certain cases may be prepared *in absentia* under direction and supervision of a member of the faculty of this institution.

The original copy of the thesis must be deposited in the office of the Graduate School not later than two weeks before the convocation at which the degree is sought. The thesis should not be bound by the student, as the University later binds all theses uniformly. An abstract of the contents of the thesis, 200 to 500 words in length, must accompany it. A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before the typing of the manuscript is begun. Individual copies of this manual may be obtained by the student from the Students' Supply Store at nominal cost.

**Final Examination.** The final oral examination is conducted by a committee appointed by the Dean of the Graduate School. The student's adviser acts as the chairman of the committee. The other members of the committee are persons under whom the student has taken most of his major and minor courses. The chairman and the candidate are notified of the personnel of the examining committee at least one week prior to the period set for oral examinations. The chairman of the committee selects the exact time and place for the examination and notifies the other members of the committee and the candidate. The examination should be conducted within the dates specified by the Dean of the Graduate School at the end of the semester, but upon recommendation of the student's adviser, an examining committee may be appointed by the Dean of the Graduate School at any time when all other requirements for the degree have been completed. A report of the committee is sent to the Dean as soon as possible after the examination. A special form for this purpose is supplied to the chairman of the committee. Such report is the basis upon which recommendation is made to the faculty that the candidate be granted the degree sought. The

period for the oral examination is usually about one hour, but the time should be long enough to insure an adequate examination.

The examining committee also approves the thesis, and it is the candidate's obligation to see that each member of the committee has ample opportunity to examine a copy of the thesis prior to the date of the examination.

A student will not be admitted to final examination until all other requirements for the degree have been met. In addition to the oral examination a comprehensive written examination may be required at the option of the major department.

## REQUIREMENTS FOR THE DEGREES IN AMERICAN CIVILIZATION

Studies in American Civilization are intended to prepare the student for teaching, for further study, and for research in the general field of American Civilization, but with emphasis on one of two disciplines: history, including European backgrounds; or literature, including European literature, particularly English. All students will be expected to understand the development of American institutions and to demonstrate proficiency in the literary, social, economic, and political history of the United States.

The study of American Civilization brings in many different fields, so a student has an unusually wide opportunity to plan a program suited to his individual needs. To help him do this, a committee representing the departments whose American fields he intends to study is set up shortly after he registers. The chairman of the committee is from the department of the student's greatest interest and acts as his adviser. The committee also prepares and reads the student's comprehensive examination and reads the thesis if one is submitted.

The candidate for a degree must pass a final written examination testing his understanding of American Civilization in terms of his individual program of studies.

**Master of Arts.** With the approval of his adviser, a candidate for the Master of Arts degree with a major in American Civilization may elect in lieu of the thesis six additional hours of course work, to include at least two substantial seminar papers. The total number of credit hours required for the degree would then be thirty semester hours.

Each candidate must present credits for at least fifteen semester hours of work in American literature and American history, and credits for at least fifteen semester hours in supporting courses (nine hours if a thesis is elected). Supporting courses will normally be in such fields as European or Latin-American history, English literature, comparative literature, philosophy, art, education, sociology, economics, and government and politics.

Each candidate must demonstrate in a written examination that he possesses a reading knowledge of one foreign language.

All other requirements are the same as for the degrees of Master of Arts and Master of Science in other fields.

**Doctor of Philosophy.** The American Civilization program cuts across several fields; therefore, a faculty committee representing the departments in which the student plans to study will be appointed shortly after the student registers. The chairman of the committee is from the department of the student's major interest and acts as his adviser. The committee is responsible for helping the student to integrate his program. Working through the student's adviser, the committee aids in planning the student's over-all program, prepares and grades any comprehensive examinations, and reads the dissertation.

The general requirements for the degree of Doctor of Philosophy in American Civilization are the same as those for the doctorate degree in other fields.

### **REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION**

Thirty semester hours of course work are required, which may include courses in departments other than Education not to exceed one-half of the total thirty hours, such courses to be selected in conformity with the student's special needs as agreed upon by the student and his adviser. Of the thirty hours, not less than one-half must be on the 200 level.

At least four of the thirty semester hours must be in seminar work or other 200 courses in connection with which two seminar papers will be prepared in specially prescribed form, approved in writing by the instructor in charge of the course work and the Dean of the College of Education, and filed in the College of Education. One of these papers shall deal with a topic in the student's major field of concentration. The other paper may be written in a 200 course outside of the field of education.

The requirements in regard to advancement to candidacy, transfer of credits, and final oral examination are the same as for the degrees of Master of Arts and Master of Science.

### **REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION**

The Master of Business Administration program is designed primarily to train students for positions of responsibility in business and government. The aim is to develop technical competence plus a thorough knowledge and appreciation of the art of management. The study of administrative policies and practices encourages interest and realistic thinking in management problems and responsibilities.

The program leading to the degree of Master of Business Administration includes advanced study of business organization and administration in the fields of accounting and statistics, finance, general business, industrial management, insurance and real estate, marketing, personnel relations, public utilities and transportation.

**Admission.** Admission to the Master of Business Administration program is limited to those students whose undergraduate records from accredited

institutions demonstrate special abilities and promise of further development. Undergraduate records, participation in student activities, and business experience are carefully evaluated. Personal interviews are desirable.

Those students whose major undergraduate work has been in arts, agriculture, science, education, or engineering subjects are required to complete certain basic core course requirements in business and economics before undertaking specialized graduate work for the degree of Master of Business Administration. The core course requirements are listed below. Responsible experience of exceptional value and importance may be substituted for specific courses.

Principles of Economics...6 hours	Marketing Principles ....3 hours
Principles of Accounting...6 hours	Marketing Management...3 hours
Business Law .....6 hours	Money and Banking.....3 hours
Labor Economics .....3 hours	Financial Management...3 hours
Personnel Management...3 hours	Statistics .....3 hours

**Curriculum Requirements.** Requirements for the Master of Business Administration degree include the completion of at least thirty hours of graduate credit in a program approved by the faculty adviser. The thirty-hour program includes 24 credit hours of course work and 6 credit hours for the thesis. At least 12 hours and not more than 16 hours of course work will be taken in the student's major field of concentration. Courses outside the major field should be related to the student's interest, and it is strongly urged that at least two credit courses in economic theory or analysis be included.

Twelve hours of the required twenty-four credit hours must be made up of courses numbered in the catalog as 200 courses, which are courses limited to graduate students. In certain fields, and with approval of the adviser, only nine course hours numbered 200 may be taken. Extra work will be prescribed by the instructor for all courses numbered 100-199 taken for graduate credit.

An average grade of "B" must be attained for the thirty graduate hours of credit.

**Thesis.** A thesis representing research in the major field of concentration and submitted in partial satisfaction of the requirements for the Master of Business Administration must be approved by the student's adviser and presented in its final form to the Dean of the Graduate School not later than the date specified in the University calendar or by the Dean. Final approval of the thesis is given by the examination committee appointed by the Dean of the Graduate School. Detailed directions for the formal preparation of the thesis may be obtained from the Student's Supply Store.

**Admission to Candidacy for the Master of Business Administration Degree.** At the beginning of the semester in which the student plans to obtain the

Master of Business Administration degree, he must make formal application to the Graduate Council for admission to candidacy for the degree. Such application must be endorsed by the student's faculty adviser, and by the head of the department in which he is studying.

The final requirement of the Master's program is the final examination, either written or oral as requested by the faculty adviser and the head of the department. The examination will cover three phases of the graduate work—the major field of specialization, the minor fields and defense of the thesis.

## REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

The Doctor of Education degree is offered for students who expect to hold teaching or administrative positions in education and who desire to develop exceptional competence in special areas. The ability to explore and solve practical educational problems is emphasized. The requirements are the same as for the degree of Doctor of Philosophy except as specified below.

**Foreign Languages.** The requirement of foreign languages may be waived for candidates for this degree when the program of study and research does not involve the use of foreign languages.

**Major and Minor Subjects.** The candidate must select one major area and one minor area in which he expects to develop exceptional competence. The minor may be a single area or may consist of a group of related courses selected to broaden the candidate's understanding of education. In addition to the major and minor, other areas if desired may be included in the program also. The amount of course work required in the major, minor, and related areas will vary according to the needs of each individual candidate.

**Project.** Instead of completing a thesis as required for a candidate for the degree of Doctor of Philosophy, a candidate for this degree must demonstrate exceptional competence to work through field problems by completing a project in the major area. A Committee on Doctoral Research is appointed for each candidate. The committee is composed of three members, at least two of whom are from the faculty of the College of Education. The committee passes upon the student's plans for research. The specialist in the student's major area serves as sponsor and provides detailed guidance for the project.

The regulations governing submission and form of copies of the project are the same as for the Doctor of Philosophy thesis.

**Comprehensive Examination.** A comprehensive examination must be passed before the candidate may take the final oral examination. The comprehensive examination may be oral or written, or both; it will cover the general field of major and minor study.

**Final Oral Examination.** The final examination covers the project and its relationship to the general field in which it lies and the candidate's attainments in related areas.

## REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

**Advancement to Candidacy.** Candidates for the Doctor's degree must be admitted to candidacy at least one academic year before the final examination. Applications for admission to candidacy for the Doctor's degree are made in duplicate by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. Blanks may be obtained at the office of the Graduate School.

The applicant must have demonstrated to the head of the Foreign Language Department that he possesses a reading knowledge of French and German. With the approval of the major department and the Graduate Council, in special cases another Foreign language may be substituted for either French or German. Preliminary examinations or such other substantial tests as the departments may elect are also required for admission to candidacy.

**Residence.** The equivalent of three years of full-time graduate study and research is the minimum required. Of the three years the equivalent of at least one year must be spent in residence at the University. On a part-time basis the time needed will be correspondingly increased. All work at other institutions offered in partial fulfillment of the requirements for the Doctor of Philosophy degree is submitted to the Graduate Council for approval, upon recommendation of the department concerned, when the student applies for admission to candidacy for the degree.

The Doctor's degree is not given merely as a certificate of residence and work, but is granted only upon sufficient evidence of high attainments in scholarship, and ability to carry on independent research in the special field in which the major work is done.

**Major and Minor Subjects.** The candidate must select a major and one or two closely related minor subjects. At least twenty-four semester hours, exclusive of research, are required in minor work. The remainder of the required residence is devoted to intensive study and research in the major field. The amount of required course work in the major subject will vary with the department and the individual candidate. The candidate must register for a minimum of twelve semester hours of research.

**Thesis.** The ability to do independent research must be shown by a dissertation on some topic connected with the major subject. An original type-written copy and two clear, plain carbon copies of the thesis, together with an abstract of the contents, 250 to 500 words in length, must be deposited in the office of the Dean at least three weeks before the convocation at which the degree is sought. It is the responsibility of the student also to provide copies of the thesis for the use of the members of the examining committee prior to the date of the final examination.

The original copy should not be bound by the student, as the University later binds uniformly all theses for the general University library. The carbon copies are bound by the student in cardboard covers which may be obtained at the Students' Supply Store. The abstracts are published biennially by the University in a special bulletin.

A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before typing of the thesis is begun. Students may obtain copies of this manual at the Students' Supply Store.

**Final Examination.** The final oral examination is held before a committee appointed by the Dean. One member of this committee is a representative of the graduate faculty who is not directly concerned with the student's graduate work. One or more members of the committee may be persons from other institutions who are distinguished scholars in the student's major field.

The duration of the examination is approximately three hours, and covers the research work of the candidate as embodied in his thesis, and his attainments in the fields of his major and minor subjects. The other detailed procedures are the same as those stated for the Master's examination.

#### **RULES GOVERNING LANGUAGE EXAMINATIONS FOR CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

1. A candidate for the Doctor's degree must show in a written examination that he possesses a reading knowledge of French and German. With the approval of the major department and the Graduate Council, in special cases another foreign language may be substituted for either French or German. The passages to be translated will be taken from books and articles in his specialized field. Some 300 pages of text from which the applicant wishes to have his examination chosen should be submitted to the head of the Department of Foreign Languages at least three days before the examination. The examination aims to test ability to use the foreign language for research purposes. It is presumed that the candidate will know sufficient grammar to distinguish inflectional forms and that he will be able to translate readily in two hours about 500 words of text, with the aid of a dictionary.

2. Application for admission to these tests must be filed in the office of the Department of Foreign Languages at least three days in advance of the tests.

3. No penalty is attached to failure in the examination, and an unsuccessful candidate is free to try again at the next date set for these tests.

4. Examinations are held near the office of the Department of Foreign Languages, on the first Tuesday of October, February and June, at 2 p.m.



### GRADUATE FEES

The fees paid by graduate students are as follows:

Matriculation fee of \$10.00. This is paid once only, upon first registration in the Graduate School.

Diploma fee for Master's degree, \$10.00.

Graduation fee for Doctor's degree including a hood, \$35.00.

#### College Park:

A fixed charge, each semester, of \$10.00 per semester credit hour for students carrying ten hours or less; for students carrying more than ten hours, \$100.00 for the semester. (Effective beginning Summer School, 1951.)

Laboratory fees, where charged, range from \$1.00 to \$10.00 per course per semester.

There is a \$2.00 fine for violation of the University parking regulations. All graduate students are expected to abide by these regulations, regardless of full-time or part-time attendance.

#### Baltimore:

The fees for graduate work at the professional schools in Baltimore are determined by the individual school concerned. Students should consult the catalog of the respective school in which they intend to pursue their work.

#### Living Expenses and Self-Help:

The University in no way assumes responsibility for the housing or medical care of graduate students.

Board and lodging are available in many private homes in College Park and vicinity. The cost of board and room varies from about \$60.00 to \$75.00 a month, depending upon the desires of the individual. A list of accommodations is maintained by the housing bureau in the office of the Dean of Men.

Application for student employment, aside from fellowships and assistantships, may be made through the offices of the Dean of Men and the Dean of Women, or to department heads.

### FELLOWSHIPS AND ASSISTANTSHIPS

**Fellowships.** A number of fellowships have been established by the University. The stipend for the University fellows is \$600 for nine months and the remission of all graduate fees except the diploma fee. Several industrial and special fellowships, with varying stipends, are also available in certain departments.

Fellows are required to render minor services prescribed by their major departments. The usual amount of service required does not exceed twelve clock hours per week. Fellows are permitted to carry a full graduate pro-

gram, and they may satisfy the residence requirement for higher degrees in the normal time.

Applications for fellowships are made on blanks which may be obtained from the office of the Graduate School. The application, with the necessary credentials, is sent by the applicant directly to the Dean of the Graduate School. Applications which are approved by the Dean are forwarded to the departments, where final selection of the fellows is made. The awards of University fellowships are on a competitive basis.

**Graduate Assistantships.** A number of teaching and research assistantships are available in several departments. The compensation is \$100 per month unless otherwise specified and varies with the nature and amount of service required and with the terms of appointment. The amount of credit allowed toward a degree likewise varies with the amount of time available for graduate study. The research assistants, especially those in the Experiment Station, usually participate in research that meets the requirements for a Master's or a Doctor's degree.

Applications for graduate assistantships are made directly to the departments concerned and appointments are made through the regular channels for staff appointments. Further information regarding these assistantships may be obtained from the department or college concerned.

## COMMENCEMENT

Attendance is required at the commencement at which the degree is conferred.

Application for diploma must be filed in the office of the Registrar eight weeks before the convocation at which the candidate expects to obtain a degree.

Academic costume is required of all candidates at commencement. Those who so desire may purchase or rent caps and gowns at the Students' Supply Store. Order must be filed eight weeks before the date of convocation but may be cancelled later if the student finds himself unable to complete his work for the degree.

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## DESCRIPTION OF COURSES

For the convenience of students in making out schedules of studies, the subjects in the following Description of Courses are arranged alphabetically:

Aeronautical Engineering.....	24
Agricultural Economics.....	26
Agricultural Education and Rural Life.....	28
Agronomy .....	29
Anatomy .....	111
Animal Husbandry .....	31
Bacteriology .....	32, 113, 117

Biochemistry .....	44, 110, 113, 117
Botany .....	33
Business Administration.....	37
Chemical Engineering.....	40
Chemistry .....	44
Civil Engineering.....	48
Comparative Literature .....	49
Dairy.....	50
Dentistry .....	22, 109
Economics .....	52
Education .....	53
Electrical Engineering.....	62
English Language and Literature.....	65
Entomology .....	67
Foreign Languages and Literature.....	68
Geography .....	72
Government and Politics.....	75
History .....	77
Home Economics .....	80
Horticulture .....	85
Mathematics .....	86
Mechanical Engineering.....	90
Medicine .....	111
Pharmaceutical Chemistry .....	118
Pharmacognosy .....	118
Pharmacology .....	115, 119
Pharmacy .....	119
Philosophy .....	92
Physical Education, Health, Recreation.....	93
Physics .....	95
Physiology .....	110, 116
Poultry Husbandry .....	99
Practical Art .....	82
Psychology .....	99
Sociology .....	103
Speech .....	105
Veterinary Science .....	107
Zoology .....	107

## METHOD OF NUMBERING COURSES AND COUNTING CREDIT HOURS

Courses for Advanced Undergraduates and Graduates are numbered 100 to 199; courses for Graduates only are numbered 200 and upward.

A course with a single number extends through one semester.

A course with a double number extends through two semesters.

The number of semester hour credits is shown by the arabic numerals in parentheses after the title of the course. Examples:

Course 101. Title (3). First semester.

If a laboratory course:

Course 101. Title (3). One lecture and two laboratory periods a week, first semester.

(This is a semester course: offered once a year.)

Course 101. Title (3). First and second semesters.

(This is a semester course, repeated each semester, and except for research, seminar, and certain problem courses, must be taken only one semester.)

Course 103, 104. Title (3, 3). Three hours a week, first and second semesters.

If a laboratory course:

Course 103, 104. Title (3, 3). One lecture and two laboratory periods a week, first and second semesters.

(This is a course extending through two semesters and carrying three semester credits each semester.)

Course 103, 104. Title (3, 3). Three hours a week, second and first semesters.

(This is a course extending through two semesters, but it begins with the second semester.)

Course 105, f, s. Title (3, 3). Three hours a week, first and second semesters.

(This is alternate way of listing a two-semester course.)

## AERONAUTICAL ENGINEERING

Professor Sherwood; Associate Professor Corning; Assistant Professors, Rivello, Shen; Instructor Hutton.

The Department of Aeronautical Engineering offers courses and opportunities for research leading to the degree of Master of Science in Aeronautical Engineering.

The candidates may elect off-campus subjects given under the College of Special and Continuation Studies of the University of Maryland, but must receive a minimum of 6 semester hours of instruction at College Park. An acceptable thesis written under the guidance of the faculty is required.

Facilities for graduate research include a complete subsonic laboratory consisting of a 7.75 x 11 ft. wind tunnel and related shops, offices and photographic equipment.

The aerodynamics laboratory is equipped with a one-foot supersonic wind tunnel, a two-foot subsonic wind tunnel, manometer boards, ballistics range, water table, high-speed flash photographic equipment, and a large electrolytic tank for the solution of fluid flow problems.

The structures laboratory has a 400,000 pound capacity universal testing machine, hydraulic tension-compression jacks and pumps, and lead shot bags for applying structural loading. Traction dynamometers and SR-4 tension-compression load cells are available to measure loads. The laboratory has SR-4 strain indication equipment, extensometers, compressometers, Huggenberger extensometers, and a recording oscillograph for measuring strain. Dial gages and a transit are available for measuring deflections.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Aero. E. 101.** Aerodynamics (3). Three lectures a week, second semester. Sherwood.
- Aero. E. 102.** Aerodynamics (2). Two lectures a week, first semester. Continuation of Aero E. 101. Sherwood.
- Aero. E. 103.** Airplane Detail Drafting (1). One laboratory period a week, first semester. Prerequisite, Dr. 3. Corning.
- Aero. E. 104.** Airplane Layout Drafting (1). One laboratory period a week, second semester. Prerequisite, Aero. E. 103. Corning.
- Aero. E. 105, 106.** Airplane Fabrication Shop (1, 2). One laboratory period a week first semester; one laboratory period and one lecture a week second semester, first and second semesters. Prerequisite, Shop 2. Rivello.
- Aero. E. 107, 108.** Airplane Design (4, 4). Two lectures and two supervised calculation periods per week, first and second semesters. Prerequisites, Aero. E. 101, Aero. E. 104, and M. E. 52. Aero. E. 102 and Aero. E. 113 to be taken concurrently. Corning.
- Aero. E. 109, 110.** Aircraft Power Plants (4, 4). Three lectures and one laboratory period a week, first and second semesters. Prerequisites, M. E. 52, M. E. 100.
- Aero. E. 111, 112.** Aeronautical Laboratory (2, 2). One lecture and one laboratory period a week, first and second semesters. Prerequisite, Aero. E. 101. To be taken concurrently with Aero. E. 102 and Aero. E. 113. Staff.
- Aero. E. 113, 114.** Mechanics of Aircraft Structures (3, 3). First and second semesters. Prerequisite, M. E. 52 and Math. 64. Rivello.

#### FOR GRADUATES

- Aero. E. 200, 201.** Advanced Aerodynamics (3, 3). Two lectures and one laboratory period a week, first and second semesters. Prerequisites, Aero. E. 101, 102, Math. 64.

- Aero. E. 202, 203.** Advanced Aircraft Structures (3, 3). First and second semesters. Prerequisites, Aero. E. 113, 114.
- Aero. E. 204.** Aircraft Dynamics (3). First semester. Prerequisites, Math. 64 and Aero. E. 114. Shen.
- Aero. E. 205.** Aircraft Dynamics (3). Second semester. Prerequisites, Math. 64 and Aero. E. 101. Shen.
- Aero. E. 206, 207.** Advanced Aircraft Power Plants (3, 3). Two lectures and one laboratory period a week, first and second semesters. Prerequisites, M. E. 100; Aero. E. 109, 110.
- Aero. E. 208, 209.** Advanced Aircraft Design and Construction (3, 3). One lecture and two laboratory periods a week, first and second semesters. Prerequisites, Aero. E. 107, 108; Math. 64.
- Aero. E. 210.** Aerodynamic Theory (3). First semester. Prerequisites, Aero. E. 101, Math. 64. Shen.
- Aero. E. 211.** The Design and Use of Wind Tunnels (Supersonic) (3). First and second semesters.
- Aero. E. 212, 213.** Bodies at Supersonic Speeds (3, 3). First and second semesters. Prerequisites, degree in Aero. E. or M. E. or equivalent, and consent of instructor.

### AGRICULTURAL ECONOMICS AND MARKETING

Professors DeVault, Beal, Walker; Lecturer Johnson; Associate Professors Hamilton, Poffenberger, Shull, Childress; Assistant Professor Bohanan; Instructor Larsen.

The Department offers instruction leading to the degrees of Master of Science and Doctor of Philosophy. The work is organized on a divisional basis, there being four divisions as follows: Farm Management, Farm Taxation and Finance, Marketing, and Land Economics. Students can get a broad general training in these fields and at the same time receive specific training in their chosen field of interest.

Candidates for the degree of Master of Science shall satisfactorily complete the following courses: (1) 3 semester hours of Principles or Fundamentals of Economics, (2) 3 semester hours of Advanced Economic Principles, or Theory, (3) 3 semester hours of Statistics, (4) 3 semester hours of Principles of Agricultural Economics, (5) 3 semester hours of History of Economic Thought and (6) 6 additional hours in other agricultural economics courses. Satisfactory completion means a grade of "B" or better for those courses required under (2), (3), (4), and (5) above.

Candidates for the degree of Doctor of Philosophy shall have satisfactorily completed a minimum of 6 hours of Economic Theory, 6 hours of Statistics, and 12 hours in other agricultural economics courses prior to the preliminary examinations. Since no preliminary examination is to

be given in the field of Statistics, candidates who have studied this subject elsewhere shall have received a grade of "B" or better.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- A. E. 100. Farm Economics (3). First semester. Prerequisites, Econ. 31, 32, or Econ. 37. Shull.
- A. E. 101. Marketing of Farm Products (3). Second semester. Prerequisites, Econ. 31, 32, or Econ. 37. Shull.
- A. E. 103. Cooperation in Agriculture (3). First semester. Poffenberger.
- A. E. 104. Farm Finance (3). Second semester. Poffenberger.
- A. E. 105. Food Products Inspection (2). One lecture and one laboratory period a week, second semester. Staff.
- A. E. 106. Prices of Farm Products (3). Second semester. Poffenberger.
- A. E. 107. Analysis of the Farm Business (3). First semester. Hamilton.
- A. E. 108. Farm Management (3). Second semester. Hamilton.
- A. E. 109. Research Problems (1-2). First and second semesters. DeVault.
- A. E. 110. Seminar (1, 1). First and second semesters. Hamilton.
- A. E. 111. Land Economics (3). First semester. Bohanan.
- A. E. 114. Foreign Trade in Farm Products (3). Second semester. Shull.
- A. E. 115. Marketing of Dairy Products (3). First semester. Beal.
- A. E. 116. Marketing of Fruits and Vegetables (3). Second semester. Childress.

Poultry Marketing. See Poultry Husbandry, P. H. 104.

Egg Marketing. See Poultry Husbandry, P. H. 105.

Poultry Industrial and Economic Problems. See Poultry Husbandry, P. H. 107.

Market Milk. See Dairy Husbandry, D. H. 109.

Livestock Markets and Marketing. See Animal Husbandry, A. H. 150

Meat and Meat Products. See Animal Husbandry, A. H. 160.

Economics of Cooperatives. See Economics, Econ. 151.

Advertising Programs and Campaigns. See Business Administration, B. A. 151.

Retail Store Management. See Business Administration, B. A. 154.

- A. E. 200, 201. Special Problems in Farm Economics (2, 2). First and second semesters. DeVault.

- A. E. 202. Seminar (1, 1). First and second semesters. DeVault.  
 A. E. 203. Research. Credit according to work accomplished. Staff.  
 A. E. 205. Special Problems in Dairy Marketing (2). Second semester.  
 Prerequisite, A. E. 115 or equivalent. Beal.  
 A. E. 208. Agricultural Policy (3). Second semester. Beal.

## FOR GRADUATES

- A. E. 210. Agricultural Taxation (2). First semester Walker.  
 A. E. 211. Functional Aspects of Farm Taxation (3). Second semester.  
 Two lectures and one laboratory period a week. Walker.  
 A. E. 215. Advanced Agricultural Cooperation (3). First semester.  
 Poffenberger.  
 A. E. 216. Advanced Farm Management (3). Second semester. (——).  
 A. E. 218. Agricultural Economics Research Techniques (2). Second  
 semester. Childress.  
 A. E. 219. Advanced Land Economics (3). First semester. Johnson.

## AGRICULTURAL EDUCATION AND RURAL LIFE

Professors Ahalt, Cotterman, Nystrom, Durfee; Associate Professor Murray.

This department offers work leading to the degree of Master of Science. Students may work full-time towards a degree or they may complete the requirements on a part-time basis, taking the special three-week courses offered for agriculture teachers in summer, regular six-week summer school courses, and courses offered in the evenings and on Saturday during the school year.

Some students profitably elect special problems courses, mostly in agriculture, in which they work on problems in their local school and community. All students are required to enroll in a minimum of four of the three-week summer sessions for agriculture teachers or the equivalent in course work on the campus at College Park.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- R. Ed. 107. Observation and Analysis of Teaching for Agricultural Students  
 (3). Two lectures and one laboratory period a week, second semester.  
 Murray.  
 R. Ed. 109. Teaching Secondary Vocational Agriculture (3). First semes-  
 ter. Ahalt, Murray.  
 R. Ed. 111. Teaching Young and Adult Farmer Groups (1). First semes-  
 ter. Murray.  
 R. Ed. 112. Departmental Management (1). One laboratory period a week,  
 second semester. Prerequisites, R. Ed. 107, 109. Murray.



- R. Ed. 114. Rural Life and Education (3). Second semester. Ahalt.  
 R. Ed. 150. Extension Education (2). Second semester. Nystrom.  
 R. Ed. 160. Agricultural Information Methods (2). First semester.  
 Durfee.

## FOR GRADUATES

- R. Ed. 201, 202. Rural Life and Education (3, 3). Three hours a week, first and second semesters. Prerequisite, R. Ed. 114, or equivalent. Ahalt.  
 R. Ed. 207, 208. Problems in Vocational Agriculture (2, 2). Two hours a week, first and second semesters. Ahalt, Murray.  
 R. Ed. 220. Field Problems in Rural Education (1-3). First and second semesters. Prerequisite, six semester hours of graduate study.  
 Ahalt, Murray.  
 R. Ed. 240. Seminar in College Teaching (1). Second semester.  
 Cotterman, Ahalt.  
 R. Ed. 250. Seminar in Rural Education (1-2). First and second semesters. Staff.  
 R. Ed. 251. Research. Credit according to work done. Staff.

## AGRONOMY—CROPS AND SOILS

Professors Kuhn, Thomas; Lecturer Nikiforoff; Associate Professors Axley, Street; Assistant Professors Burger, Liden, Ronningen, Strickling; Instructor Hogue.

The Department of Agronomy offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy. The student may pursue major work in the Crops Division or in the Soils Division of the Department. A thesis based on original research is required for each degree. Ample laboratory and greenhouse facilities for graduate work are available on the campus. The Plant Research Farm and the Tobacco Experimental Farm offer adequate nearby field research facilities. Many projects of the Department are conducted in cooperation with the Bureau of Plant Industry and Soils of the United States Department of Agriculture with headquarters located three miles from the campus.

## A. Crops

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Agron. 103. Crop Breeding (2). First semester. Prerequisite, Zool. 104.  
 Ronningen.  
 Agron. 105. Tobacco Production (2). Two lectures a week, first semester.  
 Prerequisite, Agron. 1. Street.  
 Agron. 106. Tobacco Production (2). Two lectures a week, second semester. Prerequisite, Agron. 105. Street.

- Agron. 151. Cropping Systems (2). Second semester. Kuhn.  
Agron. 152. Seed Production and Distribution (3). Two lectures and one laboratory (2 hr.) period a week, second semester. Prerequisite, Agron. 1. Liden, Hogue.

## FOR GRADUATES

- Agron. 201. Crop Breeding (2-4). Second semester. Prerequisite, consent of instructor. Ronningen.  
Agron. 203. Crop Seminar (1, 1). First and second semesters. Staff.  
Agron. 204. Technic in Field Crop Research (2). First semester. Kuhn.  
Agron. 205. Advanced Tobacco Production (2). Two lectures a week, second semester. Prerequisite, consent of instructor. Street.  
Agron. 206, 207. Recent Advances in Agronomy (2, 2). Two lectures a week, first and second semesters. Prerequisite, consent of instructor. Kuhn, Street, Ronningen, Burger.  
Agron. 208. Research Methods in Agronomy (2-4). Second semester. Prerequisite, consent of staff. Staff.  
Agron. 209. Research in Crops (1-8). First and second semesters. Staff.

## B. Soils

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Agron. 110. Soil Management (1). Summer Only. Strickling.  
Agron. 111. Soil Fertility Principles (3). Three lectures a week, first semester. Prerequisite, Agron. 10. Strickling.  
Agron. 112. Commercial Fertilizers (3). Three lectures a week, second semester. Prerequisite, Agron. 10.  
Agron. 113. Soil Conservation (3). Two lectures and one three-hour laboratory a week, second semester. Bentz.  
Agron. 114. Soil Classification (3). Two lectures and one three-hour laboratory period a week, first semester. Prerequisite, Agron. 10. Nikiforoff.  
Agron. 115. Soil Geography (3). Two lectures and one three-hour laboratory period a week, second semester. Prerequisite, Agron. 114, or Geo. 30, 40, and 41, or permission of instructor. Nikiforoff.  
Agron. 116. Soil Investigation Methods (3). One hour lecture, one two-hour laboratory, and one three-hour laboratory a week, first semester. Axley.  
Agron. 117. Soil Physics (3). Two lectures and one three-hour laboratory a week, second semester. Prerequisite, Agron. 10 and a course in Physics, or permission of instructor. Strickling.

- Agron. 118. Special Problem in Soils (1).** First and second semesters.  
Prerequisite, Agron. 10 and permission of instructor. Staff.

## FOR GRADUATES

- Agron. 250. Soil Minerology (3).** Three one-hour lectures a week, first semester. Prerequisite, Agron. 10 and permission of instructor.
- Agron. 251. Advanced Methods of Soil Investigation (3).** Three one-hour lectures a week, second semester. Prerequisite, Agron. 10 and permission of instructor. Axley.
- Agron. 252. Advanced Soil Physics (3).** Two lectures and one three-hour laboratory a week, second semester. Prerequisite, Agron. 10 and permission of instructor. Strickling.
- Agron. 253, 254. Soil Research Technique (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisite, permission of instructor. Axley.
- Agron. 255. Soil Seminar (1, 1).** First and second semesters. Prerequisite, permission of instructor. Staff.
- Agron. 256. Soil Research (1-12).** First and second semesters. Staff.

## ANIMAL HUSBANDRY

Professors Foster, Green; Associate Professors Outhouse, Kerr; Instructor Buric.

The Department of Animal Husbandry offers work leading to the degree of Master of Science. Although the major field is Animal Husbandry, course work and thesis problems are offered in the fields of animal breeding, livestock management, meats, and nutrition.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- A. H. 111. Animal Nutrition (3).** First semester. Prerequisite, Chem. 31, 32, 33, 34; A. H. 110. Graduate credit allowed with permission of instructor. Shaw.
- A. H. 120. Principles of Breeding (3).** Two lectures and one laboratory period a week, second semester. Prerequisite, Zool. 104. Graduate credit (1-3 hours) allowed with permission of instructor. Green.
- A. H. 150. Livestock Markets and Marketing (2).** First semester. Prerequisite, A. H. 1. Graduate credit allowed with permission of instructor. Kerr.

## FOR GRADUATES

- A. H. 200, 201. Special Problems in Animal Husbandry (1-2, 1-2).** First and second semesters. Work assigned in proportion to amount of credit. Prerequisite, approval of staff. Staff.
- A. H. 202, 203. Seminar (1, 1).** First and second semesters. Staff.

- A. H. 204. Research (1-6).** First and second semesters. Credit to be determined by amount and character of work done. Staff.
- A. H. 205. Advanced Breeding (2).** Second semester. Prerequisites, Zool. 104; A. H. 120; one course in biological statistics. Green.
- A. H. 206. Advanced Livestock Management (3).** Two lectures and one laboratory period a week, first semester. Prerequisite, approval of staff. Staff.

### BACTERIOLOGY

Professors Faber, Nansen; Visiting Professors Smadel, Warren; Associate Professors Laffer, Pelczar; Assistant Professor Doetsch.

The Department of Bacteriology offers the degrees of Master of Science and Doctor of Philosophy.

Graduate students associated with institutions away from the College Park campus are required to take a minimum of 12 credit hours, exclusive of research, during one semester at College Park for the degree of Master of Science, and a minimum of 24 credit hours, exclusive of reasearch, during two semesters at College Park for the degree of Doctor of Philosophy.

The research project, the experimental approach employed, and progress made must meet with the approval of the head of the department.

Further information concerning graduate work in Bacteriology may be obtained from the department.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bact. 101. Pathogenic Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 5. Faber.
- Bact. 103. Serology (4).** Two lecture and two laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, Bact. 101. Faber.
- Bact. 104. History of Bacteriology (1).** One lecture period a week, first semester. Prerequisite, a major or minor in bacteriology. Doetsch.
- Bact. 105. Clinical Methods (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 103. Faber.
- Bact. 108. Epidemiology and Public Health (3).** Three lecture periods a week, second semester. Prerequisite, Bact. 101. Faber.
- Bact. 131. Food Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 5. Laffer.
- Bact. 133. Dairy Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 5. Doetsch.

- Bact. 135. Soil Bacteriology (4).** Two lecture and two laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, Bact. 5. Hansen.
- Bact. 161. Systematic Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, 16 credits in bacteriology. Hansen.
- Bact. 181. Bacteriological Problems (3).** First and second semesters. Prerequisite, 16 credits in bacteriology. Laboratory fee, \$10.00. Registration only upon the consent of the instructor. Staff.

## FOR GRADUATES

- Bact. 201. Advanced Pathogenic Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, 30 credits in bacteriology and allied fields, including Bact. 103. Laffer.
- Bact. 204. Bacterial Metabolism (2).** Two lecture periods a week, first semester. Prerequisite, 30 credits in bacteriology and allied fields, including Chem. 161 and 162. Pelczar.
- Bact. 206, 208. Special Topics (1, 1).** One lecture period a week, first and second semesters. Prerequisite, 20 credits in bacteriology. Staff.
- Bact. 210. Virology (1).** One lecture period a week, second semester. Prerequisite, Bact. 101 or equivalent. Warren.
- Bact. 211. Virology Laboratory (2).** One lecture and one laboratory period a week, second semester. Prerequisite, Bact. 101 or equivalent. Registration only upon consent of instructor. Smadel.
- Bact. 214. Advanced Bacterial Metabolism (1).** One lecture period a week, second semester. Prerequisite, Bact. 204 and consent of instructor. Pelczar.
- Bact. 231. Advanced Food Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, 30 credits in bacteriology, including Bact. 131. Laffer.
- Bact. 280. Seminar (1).** First and second semesters. Prerequisite, 30 credits in bacteriology. Staff.
- Bact. 291. Research.** First and second semesters. Laboratory fee, \$10.00. Prerequisite, 30 credits in bacteriology. Staff.

## BOTANY

Professors Bamford, Jeffers, Gauch, Cox, Appleman (emeritus), Norton (emeritus); Associate Professors Brown, Weaver; Assistant Professors D. T. Morgan, O. D. Morgan, Dugger, Rappleye; Instructor Owens.

The Department of Botany offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy.

The student may pursue major work in any one of the three main divisions of the department, namely: Plant Physiology, Plant Pathology, or Plant Morphology, Cytology and Cytogenetics. Since a thesis based on original research is required for each degree, a qualified student may be allowed to pursue a problem of his own choosing, but it is more probable that the subject of his research will be that already in progress since the department is devoted to a study of basic agricultural problems as well as projects of a more fundamental nature.

An individual employed at a nearby institution may submit a thesis on his research work at that institution under the direction of, and approved by, a member of the faculty. Laboratory facilities are available for research in each division, and there are ample greenhouses and plot space available on the campus or adjacent University farm land.

In addition to the normal requirements of the Graduate School, one must possess a reading knowledge of either French or German, before the Master of Science degree is granted.

### A. Plant Physiology

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bot. 101. Plant Physiology (4).** Two lectures and two laboratory periods a week, first semester. Prerequisites, Bot. 1, and general chemistry. Laboratory fee, \$5.00. Gauch, Dugger.
- Bot. 102. Plant Ecology (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, Bot. 11, or equivalent. Laboratory fee, \$5.00. Brown.

#### FOR GRADUATES

- Bot. 201. Plant Biochemistry (4).** First semester. Prerequisites, Bot. 101, and elementary organic chemistry, or equivalent. Laboratory fee, \$5.00. Not offered 1951-1952. Gauch.
- Bot. 202. Plant Biophysics (2).** Second semester. Prerequisites, Bot. 101, and elementary physics, or equivalent. Dugger.
- Bot. 203. Biophysical Methods (2).** Second semester. To accompany Bot. 202. Same prerequisites. Laboratory fee, \$5.00. Dugger.
- Bot. 204. Growth and Development (2).** Second semester. Prerequisite, 12 semester hours of plant science. Dugger.
- Bot. 205. Mineral Nutrition of Plants (2).** Second semester. Prerequisite, Bot. 101, or equivalent. Not offered 1951-1952. Gauch.
- Bot. 206. Research in Plant Physiology.** Credit according to work done. Gauch, Dugger.
- Bot. 207. Special Topics in Plant Physiology (2).** Second semester. Prerequisite, permission of instructor.

- Bot. 208. Seminar in Plant Physiology (1).** Second semester. Prerequisite, permission of instructor. Gauch, Dugger.

### B. General Botany and Morphology

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bot. 111. Plant Anatomy (3).** One lecture and two laboratory periods a week, first semester. Prerequisite, Bot. 110, or equivalent. Laboratory fee, \$5.00. Rappleye.
- Bot. 113. Plant Geography (2).** First semester. Prerequisite, Bot. 1, or equivalent. Brown.
- Bot. 114. Advanced Plant Taxonomy (3).** One lecture and two laboratory periods a week, first semester. Prerequisite, Bot. 11, or equivalent. Laboratory fee, \$5.00. Brown.
- Bot. 115. Structure of Economic Plants (3).** One lecture and two laboratory periods a week, second semester. Prerequisite, Bot. 111. Laboratory fee, \$5.00. Rappleye.
- Bot. 116. History and Philosophy of Botany (1).** First semester. Prerequisite, 15 semester hours of botany. Bamford.
- Bot. 117. Plant Breeding (2).** Second semester. Prerequisites. Zool. 104, or equivalent. D. T. Morgan.
- Bot. 133. Bryophytes and Pteridophytes (3).** One lecture and two laboratory periods a week, second semester. Prerequisites Bot. 1, Bot. 2, or equivalent. Laboratory fee, \$5.00. Owens.
- Bot. 135. Aquatic Plants (3).** One lecture and two laboratory periods a week, first semester. Prerequisites, Bot. 1, Bot. 11 or equivalent. Laboratory fee, \$5.00. Owens.
- Bot. 151S. Teaching Methods in Botany (2).** Summer. Prerequisite, Bot. 1, or equivalent. Laboratory fee, \$5.00. Owens.

#### FOR GRADUATES

- Bot. 211. Cytology (4).** Two lectures and two laboratory periods a week, second semester. Prerequisites, Bot. 110, Zool. 104. Laboratory fee, \$5.00. Bamford, D. T. Morgan.
- Bot. 212. Plant Morphology (3).** One lecture and two laboratory periods a week, first semester. Prerequisites, Bot. 11, Bot. 111, or equivalent. Laboratory fee, \$5.00. Rappleye.
- Bot. 213. Seminar in Plant Cytology and Morphology (1).** First and second semesters. Prerequisite, permission of instructor. D. T. Morgan, Rappleye.
- Bot. 214. Research in Plant Cytology and Morphology.** Credit according to work done. Bamford, D. T. Morgan.

Bot. 215. Plant Cytogenetics (3). First semester. Prerequisites, Zool. 104, Bot. 211. Laboratory fee, \$5.00. D. T. Morgan.

Bot. 219. Special Topics in Plant Morphology and Cytology (2). First semester. Prerequisite, permission of instructor.

### C. Plant Pathology

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

Bot. 122. Research Methods in Plant Pathology (2). Two laboratory periods a week, first and second semesters. Prerequisite, Bot. 20, or equivalent. Laboratory fee, \$5.00. Cox.

Bot. 123. Diseases of Ornamental Plants (2). Second semester. Prerequisite, Bot. 20, or equivalent. Jeffers.

Bot. 124. Diseases of Tobacco and Agronomic Crops (2). First semester. Prerequisite, Bot. 20, or equivalent. Not offered 1951-1952.

O. D. Morgan.

Bot. 125. Diseases of Fruit Crops (2). First semester. Prerequisite, Bot. 20, or equivalent. Weaver.

Bot. 126. Diseases of Vegetable Crops (2). Second semester. Prerequisite, Bot. 20, or equivalent. Not offered 1951-1952. Cox.

Bot. 128. Mycology (4). Two lectures and two laboratory periods a week, second semester. Prerequisite, Bot. 2, or equivalent. Laboratory fee, \$5.00. Jeffers.

Bot. 152S. Field Plant Pathology (1). Summer, first three weeks. Laboratory fee, \$5.00. Prerequisite, Bot. 20, or equivalent. Cox, Staff.

#### FOR GRADUATES

Bot. 221. Virus Diseases (3). Two lectures and one laboratory period a week, second semester. Prerequisites, Bot. 20, 101. Laboratory fee, \$5.00. Not offered 1951-1952.

Bot. 222. Plant Nematology (2). Not offered 1951-1952. Two lectures. Prerequisite, Bot. 20, or equivalent.

Bot. 225. Research in Plant Pathology. Credit according to work done. Staff.

Bot. 226. Plant Disease Control (3). First semester. Prerequisite, Bot. 20, or equivalent. Cox.

Bot. 228. Special Topics in Plant Pathology (2). Second semester. Prerequisite, permission of instructor. Not offered 1951-1952.

Bot. 229. Seminar in Plant Pathology (1). First and second semesters. Jeffers, Cox.



## BUSINESS ADMINISTRATION

Professors Thatcher, Calhoun, Capen, Clemens, Cook, Cover, Frederick, Johnson, Mounce, Pyle, Reid, Sweeney, Sylvester, Watson, Wedeberg, Wright; Associate Professors Hale, McLarney; Assistant Professors Ash, Cronin, Fleming, McHugh, Taff; Instructors Daiker, Edelson, Giffin, Lee Richard, Sarle, Sinclair.

The degree of Master of Business Administration is conferred on those students who satisfactorily complete the requirements which are set forth in the section of this catalog entitled, "Requirements for the Degree of Master of Business Administration."

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- B. A. 110, 111. Intermediate Accounting (3, 3).** First and second semesters. Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Daiker.
- B. A. 116. Public Budgeting (3).** Prerequisites, B. A. 21 and Econ. 32.
- B. A. 118. Governmental Accounting (3).** Prerequisite, B. A. 111.
- B. A. 121. Cost Accounting (4).** Second semester. Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Sweeney.
- B. A. 122. Auditing Theory and Practice (3).** First semester. Prerequisite, B. A. 111. Wright.
- B. A. 123. Income Tax Accounting (4).** Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Wedeberg.
- B. A. 124, 126. Advanced Accounting (3, 3).** First and second semesters. Prerequisite, B. A. 111. Wedeberg.
- B. A. 125. C. P. A. Problems (3).** Second semester. Prerequisite, B. A. 124, or consent of instructor. Wright.
- B. A. 127. Advanced Auditing Theory and Practice (3).** Second semester. Prerequisite, B. A. 122. Wright.
- B. A. 130. Elements of Business Statistics (3).** First and second semesters. Staff.
- B. A. 131. Statistics Laboratory.**
- B. A. 132, 133. Advanced Business Statistics (3, 3).** First and second semesters. Prerequisite, B. A. 130. Ash.
- B. A. 140. Financial Management (3).** Prerequisite, B. A. 21, Econ. 140. Calhoun, Thatcher.
- B. A. 141. Investment Management (3).** First semester. Prerequisite, B. A. 140. Calhoun.
- B. A. 142. Banking Policies and Practices (3).** Second semester. Prerequisite, Econ. 140.

- B. A. 143. Credit Management (3). Second semester. Prerequisite, B. A. 140. Calhoun.
- B. A. 147. Business Cycles (3). First semester. Prerequisite, Econ. 140. Dillard.
- B. A. 148. Advanced Financial Management (3). Prerequisite, B. A. 140.
- B. A. 149. Analysis of Financial Statements (3). Prerequisite, B. A. 140.
- B. A. 150. Marketing Management (3). Prerequisite, Econ. 150. Cook, Reid.
- B. A. 151. Advertising Programs and Campaigns (3). First semester. Prerequisite, B. A. 150. Johnson.
- B. A. 152. Advertising Copy Writing and Layout (3). Second semester. Prerequisite, B. A. 151. Johnson.
- B. A. 153. Purchasing Management (3). Second semester. Prerequisite, B. A. 150. Johnson.
- B. A. 154. Retail Store Management (3). First semester. Prerequisite. Econ. 150. Cook.
- B. A. 155. Problems in Retail Merchandising (3). Prerequisite, B. A. 154. Frederick.
- B. A. 157. Foreign Trade Procedure (3). Prerequisite, B. A. 150.
- B. A. 160. Personnel Management (3). Prerequisite, Econ. 160. Sylvester.
- B. A. 163. Industrial Relations (3). Second semester. Prerequisite, Econ. 160. Sylvester.
- B. A. 164. Labor Legislation and Court Decisions (3). Second semester. Prerequisite, B. A. 160. Sylvester.
- B. A. 165. Office Management (3). First and second semesters. Patrick.
- B. A. 166. Business Communications (3). First and second semesters. Thomas.
- B. A. 167. Job Evaluation and Merit Rating (2). Prerequisite, B. A. 160. McLarney.
- B. A. 168. Advanced Office Management (3). Second semester. Prerequisite, B. A. 165.
- B. A. 169. Industrial Management (3). Second semester. Prerequisites, B. A. 11 and 160.
- B. A. 170. Transportation Services and Regulation (3). Prerequisite, Econ. 32 or 37. Frederick.
- B. A. 171. Industrial and Commercial Traffic Management (3). Prerequisite, B. A. 170.
- B. A. 172. Motor Transportation (3). Prerequisite, B. A. 170. Taff.

- B. A. 173. Overseas Shipping (3). Prerequisite, B. A. 170. Frederick.
- B. A. 174. Commercial Air Transportation (3). Prerequisite, B. A. 170.  
Frederick.
- B. A. 175. Airline Administration (3). Prerequisite, B. A. 174. Frderick.
- B. A. 176. Problems in Airport Management (3). Prerequisite, B. A. 174.  
Frederick.
- B. A. 177. Motion Economy and Time Study (3). Prerequisite, B. A. 169.  
McLarney.
- B. A. 178. Production Planning and Control (2). Prerequisite, B. A. 169.  
McLarney.
- B. A. 179. Problems in Supervision (3). Prerequisite, B. A. 169.  
McLarney.
- B. A. 180. Business Law (4, 4). First and second semesters.  
Hale, Mounce.
- B. A. 184. Public Utilities (3). Prerequisites, Econ. 32 and 37. Clemens.
- B. A. 189. Business and Government (3). Second semester. Prerequisite,  
Econ. 32 or 37. Thatcher.
- B. A. 190. Life Insurance (3). First semester. Prerequisite, Econ. 32  
or 37. Watson.
- B. A. 191. Property Insurance (3). Second semester. Prerequisite, Econ.  
32 or 37. Watson.
- B. A. 194. Insurance Agency Management (3). First semester. Prere-  
quisite, B. A. 190 or 191. Watson.
- B. A. 195. Real Estate Principles (3). First semester. Prerequisite, Econ.  
32 or 37. Watson.
- B. A. 196. Real Estate Finance (3). Second semester. Prerequisite, Econ.  
32 or 37. Watson.
- B. A. 197. Real Estate Management (3). Second semester. Prerequisite,  
B. A. 195 or 196. Watson.

## FOR GRADUATES

- B. A. 210. Advanced Accounting Theory (2, 3). Prerequisite, B. A. 111.  
Wedeborg, Wright.
- B. A. 220. Managerial Accounting (3). Wedeborg, Wright.
- B. A. 221, 222. Seminar in Accounting. (Arranged). Wedeborg, Wright.
- B. A. 226. Accounting Systems (3). Wedeborg, Wright.
- B. A. 228. Research in Accounting. (Arranged). Wedeborg, Wright.
- B. A. 229. Studies of Special Problems in the Fields of Control and Organ-  
ization. (Arranged).

- B. A. 240. Seminar in Financial Management (1-3). Prerequisite, B. A. 140. Calhoun, Thatcher.
- B. A. 249. Studies of Special Problems in the Field of Financial Administration. (Arranged). Calhoun, Thatcher.
- B. A. 250. Problems in Sales Management (1-3). Cook, Reid.
- B. A. 251. Problems in Advertising (3). Johnson.
- B. A. 252. Problems in Retail Store Management (3). Cook.
- B. A. 257. Seminar in Marketing Management. (Arranged). Cook, Johnson, Reid.
- B. A. 258. Research in Marketing. (Arranged). Cook, Johnson.
- B. A. 262. Seminar in Contemporary Trends in Labor Relations. (Arranged). Sylvester.
- B. A. 265. Development and Trends in Modern Industrial Management (3). McLarney, Sylvester.
- B. A. 266. Research in Personnel Management. (Arranged). Sylvester.
- B. A. 267. Research in Industrial Relations. (Arranged). Sylvester.
- B. A. 269. Studies of Special Problems in Employer-Employee Relationships. (Arranged). Sylvester.
- B. A. 270. Seminar in Air Transportation (3). Frederick.
- B. A. 271. Theory of Organization (3). McLarney.
- B. A. 277. Seminar in Transportation (3).
- B. A. 280. Seminar in Business and Government Relationships. (Arranged). Thatcher.
- B. A. 284. Seminar in Public Utilities (3). Clemens, Thatcher.
- B. A. 290. Seminar in Insurance (3). Watson.
- B. A. 295. Seminar in Real Estate (3). Watson.
- B. A. 299. Thesis. (Arranged). Staff.

### CHEMICAL ENGINEERING

Professors Huff, Bonney; Office of Naval Research Lecturers Loring, Salkovitz, Stauss, Zerfoss, Harris; Army Chemical Center Lecturers MacRae, Magram; Associate Professors Klier, Smatko; Assistant Professors Gottschalk, Landgren; Instructor Bilbrey.

The Department reserves the right to prescribe regulations governing admission to examinations, publication of thesis or of material to be offered for thesis credit, or other experimental or research work to which the Department or its members have contributed. This reservation includes applications for patents based upon such material.

## MASTER OF SCIENCE

An adequate background of the fundamentals of chemical engineering or chemistry is required as a foundation for graduate work in chemical engineering. General chemistry, quantitative analysis, organic chemistry, physical chemistry, physics, mechanics, thermodynamics, elements of electrical engineering, elements of chemical engineering, and unit operations in chemical engineering are required for acceptable graduate status. In fulfilling the requirements for the Master of Science degree in chemical engineering, the candidate should first make up any deficiencies in his earlier training. In addition to the above, credit for the following courses or their equivalent at some stage of the candidate's training is required:

Ch. E. 107; 207 f and s; 214; 203; 210 f and s, or Ch. E. 202, or Ch. E. 114.

Before the Master's thesis is accepted the applicant must pass qualifying written examinations in Elements of Chemical Engineering, Unit Operations in Chemical Engineering, Thermodynamics, Chemical Engineering Calculations and such other subjects as the Department may prescribe.

## DOCTOR OF PHILOSOPHY

For the Doctor of Philosophy degree, every applicant must pass qualifying examinations preliminary to advancement to candidacy at least one academic year before the degree is to be given. At the discretion of the Departmental faculty, credit may be given for the written examinations for the Master's degree referred to above, or different and additional examinations may be prescribed.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

Ch. E. 103 f,s. Elements of Chemical Engineering (3, 3). Three hours a week, both semesters. Prerequisites, Chem. 1, 3; Phys. 20, 21.

Huff, Smatko.

Ch. E. 104. Chemical Engineering Seminar (1). One hour a week, both semesters. Prerequisite, permission of the Department. The contents of this course are constantly changing so a student may receive a number of credits by re-registering.

Huff.

Ch. E. 105 f,s. Advanced Unit Operations (5, 5). Two lectures and one all-day laboratory a week, both semesters. Prerequisites, Ch. E. 103 f,s; Chem. 187, 188, 189, 190. Laboratory fee, \$8.00 per semester.

Bonney, Landgren and Staff.

Ch. E. 106 f,s. Minor Problems (6, 6). Six hours a week, both semesters. Prerequisites, Ch. E. 105 or simultaneous registration therein. Laboratory fee, \$8.00.

Huff, Bonney, Smatko, Klier, Landgren.

Ch. E. 107. Fuels and Their Utilization (3). Three hours a week, second semester. Prerequisite, Ch. E. 103 f,s, or permission of the department.

Huff.

- Ch. E. 108 f.s. **Industrial Chemical Technology (2, 2)**. Two hours a week, both semesters. Prerequisite, Ch. E. 3, or simultaneous registration therein, or permission of the department. Smatko.
- Ch. E. 109 f.s. **Chemical Engineering Thermodynamics (3, 3)**. Two hours a week, both semesters. Prerequisites, Ch. E. 103 f.s.; Chem. 187, 189, or permission of the department. Landgren.
- Ch. E. 110. **Advanced Chemical Engineering Calculations (3)**. Three hours a week, first semester. Prerequisites, Math. 20, 21; Ch. E. 103 f.s. Bilbrey.
- Ch. E. 114. **Applications of Electrochemistry (4)**. Three lecture hours and three laboratory hours a week, first semester. Prerequisite, consent of instructor. Laboratory fee, \$8.00. Smatko.
- Ch. E. 119. **Empirical Equations and Nomography (3)**. Three hours a week, second semester. Prerequisite, consent of instructor. Bilbrey.
- Ch. E. 164. **Thermodynamics of Metallurgical Processes (3, 3)**. Three lectures a week, both semesters. Prerequisites, Chem. 187, 189; Chem. 188, 190. Klier.
- Ch. E. 168, 170. **Metallurgical Investigations (2, 4)**. First semester, two three-hour laboratory periods a week; second semester, three lectures and one three-hour laboratory period a week. Prerequisites, Ch. E. 182, 183. Laboratory fee, \$8.00. Klier.
- Ch. E. 182, 183. **Optical and X-ray Metallography (4, 4)**. Three lectures and one laboratory a week, both semesters. Prerequisites, Ch. E. 64, 66; Ch. E. 68, 70, or permission of instructor. Laboratory fee, \$8.00. Klier.
- Ch. E. 188, 189. **Alloy Steels I, II (2, 2)**. Two lectures a week, both semesters. Ch. E. 188 is not prerequisite to Ch. E. 189. Offered at Office of Naval Research. Loring.

#### FOR GRADUATES

- Ch. E. 201. **Graduate Unit Operations and Processes (5)**. One hour conference, three or more three-hour laboratory periods a week, first semester. Prerequisite, permission of the department. Laboratory fee, \$8.00. Bonney.
- Ch. E. 202 f.s. **Gas Analysis (3)**. One lecture and two three-hour laboratory periods a week, one semester, to be arranged. Prerequisite, permission of the department. Laboratory fee, \$8.00. Bonney.
- Ch. E. 203. **Graduate Seminar (1)**. One hour a week, each semester. The content of this work is constantly changing, so a student may receive a number of credits by re-registering. Prerequisite, permission of the department. Huff.
- Ch. E. 205. **Research and Chemical Engineering and Metallurgy**. Prerequisites and credits to be arranged for individuals. Laboratory fee, \$8.00 per semester. Huff, Bonney, Smatko, Klier, Landgren.

- Ch. E. 207 f.s. Plant Design Studies (3, 3). Three hours a week, both semesters. Prerequisite, permission of the department. Huff.
- Ch. E. 209 f.s. Plant Design Studies Laboratory (3, 3). Three laboratory periods a week, both semesters. Prerequisite, permission of the department. Laboratory fee, \$8.00 per semester. Bonney.
- Ch. E. 210 f.s. Gaseous Fuels (2, 2). Two hours a week, both semesters. Prerequisite, permission of the department. Huff.
- Ch. E. 214. Corrosion and Metal Protection (4). Second semester. Four lecture hours a week. Prerequisites, Ch. E. 114 or Chem. 187, 189 or Chem. 188, 190, or consent of the instructor. Smatko.
- Ch. E. 216. Unit Processes of Organic Technology (3). Three lectures a week, second semester. Required of graduate students in chemical engineering. Prerequisite, permission of the Department. Smatko.
- Ch. E. 217. Unit Processes of Organic Technology Laboratory (2). Two or more laboratory periods a week, second semester. Required of graduate students in chemical engineering. Prerequisite, permission of the instructor. Laboratory fee, \$8.00. Bonney, Smatko.
- Ch. E. 220, 221. Solid Phase Reactions (3, 3). Both semesters.. Prerequisites, Chem. 187; Chem. 188, 190; Ch. E. 182, 183; or permission of the instructor. Klier.
- Ch. E. 224, 225. Advanced X-ray Metallography (3, 3). Two lectures and one laboratory period a week, both semesters. Prerequisites, Math 114, 115; Ch. E. 182, 183. Laboratory fee, \$8.00 Klier.
- Ch. E. 228. Seminar in Metallurgy (1). One meeting a week, both semesters. Required of graduate students in metallurgical curriculum. The content of this course is constantly changing so a student may earn a number of credits by re-registering. Klier.
- Ch. E. 229. Gases in Metals (2). Two lectures a week, second semester. Prerequisites, Ch. E. 182, 183, or permission of instructor. Klier.
- Ch. E. 230, 231. Mechanical Metallurgy (3, 3). Three lectures a week, both semesters. Prerequisites, Math. 114, 115; Ch. E. 182, 183. Klier.
- Ch. E. 232, 233. Advanced Physical Metallurgy (3, 3). Three lectures a week, both semesters. Required of graduate students in metallurgical curriculum. (Offered at the Office of Naval Research.)  
Salkovitz, Stauss, Zerfoss, Harris.
- Ch. E. 240, 241. Advanced Heat Transmission (2, 2). Two lectures a week, both semesters. Elective of graduate students in chemical engineering and others. Prerequisite, permission of the Department. (Offered at the Army Chemical Center.) Gottschalk.
- Ch. E. 250. Chemical Engineering Practice (8). Summer school. Four hours conference and forty hours a week of work in laboratory and plant for eight weeks. Prerequisite, permission of the Department. (Offered at the Army Chemical Center only.) Day, Bilbrey.

- Ch. E. 270. Plastics Technology (3).** Two lectures and one laboratory a week, first semester. Required of students in chemical engineering. Prerequisite, permission of the Department. Laboratory fee, \$8.00. Smatko.
- Ch. E. 280. Graduate Chemical Engineering Thermodynamics (3).** Three lectures a week, second semester. Prerequisites, Ch. E. 109, f,s; Ch. E. 110; or permission of instructor. Landgren.

## CHEMISTRY

Professors Drake, Svrbely, White; Associate Professors Pickard, Pratt, Reeve, Rollinson, Spurr, Veitch, Wiley, Woods; Assistant Professors Aldridge, Brown, Carruthers, Dewey, Story, Stuntz.

Departmental regulations have been assembled for the guidance of candidates for graduate degrees. Copies of these regulations are available from the Department of Chemistry.

Laboratory fees in Chemistry are \$10.00 per laboratory course per semester.

### A. Analytical Chemistry

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 166, 167. Food Analysis (3, 3).** One lecture and two three-hour laboratory periods per week, first and second semesters. Prerequisites, Chem. 19, 31, 32, 33, 34. Wiley.

#### FOR GRADUATES

- Chem. 206, 208. Spectrographic Analysis (1, 1).** One three-hour laboratory a week. Prerequisite, Chem. 188, 190, and consent of the instructor. Registration limited. White.
- Chem. 221, 223. Chemical Microscopy (2, 2).** One lecture and three one-hour laboratory periods a week, first and second semesters. Registration limited. Prerequisite, consent of instructor. Stuntz.
- Chem. 225. Polarography (2).** Two lectures a week.
- Chem. 226, 228. Advanced Quantitative Analysis (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of instructor. Stuntz.
- Chem. 266. Biological Analysis (2).** Two three-hour laboratory periods a week, second semester. Prerequisites, Chem. 19, 31, 32, 33, 34. Wiley.

### B. Biochemistry

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 161, 163. Biochemistry (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Chem. 31, 33, or Chem. 35, 37.



**Chem. 162, 164. Biochemistry Laboratory (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 32, 34, or Chem. 36, 38.

#### FOR GRADUATES

**Chem. 261, 263. Advanced Biochemistry (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Chem. 141, 143, or consent of instructor. Veitch.

**Chem. 262, 264. Advanced Biochemistry Laboratory (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of the instructor. Veitch.

**Chem. 265. Enzymes (2).** Two lectures a week, first semester. Prerequisites, Chem 161, 163. Veitch.

**Chem. 268. Special Problems in Biochemistry (2-4).** Two to four three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 161, 162, 163, 164, and consent of the instructor. Veitch.

### C. Inorganic Chemistry

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 101. Advanced Inorganic Chemistry (2).** Two lectures a week, second semester. Prerequisites, Chem. 23 and 37, 38.

#### FOR GRADUATES

**Chem. 201, 203. The Chemistry of Rarer Elements (2, 2).** Two lectures a week, first and second semesters. White.

**Chem. 202, 204. Advanced Inorganic Laboratory (2, 2).** Two three-hour laboratory periods a week, first and second semesters.

**Chem. 205. Radiochemistry (2).** Two lectures a week. Rollinson.

**Chem. 207. Chemistry of Co-ordination Compounds (2).** Two lectures a week. Rollinson.

**Chem. 209. Non-aqueous Inorganic Solvents (2).** Two lectures a week, first or second semester. Story.

**Chem. 210. Radiochemistry Laboratory (1 or 2).** One or two three-hour laboratory periods a week. Registration limited. Prerequisites, Chem. 205 (or concurrent registration therein) and consent of instructor.

Rollinson.

**Chem. 239. Physical Techniques in Chemistry (2).**

### D. Organic Chemistry

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 141, 143. Advanced Organic Chemistry (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Chem. 37, 38.

- Chem. 142, 144. Advanced Organic Laboratory (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 37, 38.
- Chem. 146, 148. The Identification of Organic Compounds (2, 2).** Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 141, 143, or concurrent registration therein.
- Chem. 150. Organic Quantitative Analysis (2).** Two three-hour laboratory periods per week, first and second semesters.

## FOR GRADUATES

(One or more courses from the following group 241-254 will customarily be offered each semester. Two of these courses will be presented in the academic year 1951-1952.)

- Chem. 241. Stereochemistry (2).** Two lectures a week. Woods.
- Chem. 243. The Chemistry of Petroleum Processing (2).** Two lectures a week, second semester. Prerequisites, Chem. 141, 143, 187, 189.
- Chem. 245. The Chemistry of the Steroids (2).** Two lectures a week. Pratt.
- Chem. 249. Physical Aspects of Organic Chemistry (2).** Two lectures a week. Woods.
- Chem. 251. The Heterocyclics (2).** Two lectures a week. Pratt.
- Chem. 253. Organic Sulfur Compounds (2).** Two lectures a week. Dewey.
- Chem. 254. Advanced Organic Preparations (2 to 4).** Two to four three-hour laboratory periods a week, first and second semesters.
- Chem. 258. The Identification of Organic Compounds, an Advanced Course (2 to 4).** Two to four three-hour laboratory periods a week, first and second semesters. Pratt.
- Chem. 260. Advanced Organic Laboratory (1 or 2).** One or two three-hour laboratory periods per week, first and second semesters. Pratt.

## E. Physical Chemistry

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 181, 183. Elements of Physical Chemistry (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Chem. 19; Phys. 1, 2; Math. 10, 11.
- Chem. 182, 184. Elements of Physical Chemistry Laboratory (1, 1).** One three-hour laboratory period a week, first and second semesters. May be taken ONLY when accompanied by Chem. 181, 183.
- Chem. 187, 189. Physical Chemistry (3, 3).** Three lectures a week, first and second semesters. Prerequisites, Chem. 19 or 21; Phys. 20, 21; Math. 20, 21.

**Chem. 188, 190. Physical Chemistry Laboratory (2, 2).** Two three-hour laboratory periods a week, first and second semesters. A laboratory course for students taking Chem. 187, 189.

**Chem. 192, 194. Glassblowing Laboratory (1, 1).** One three-hour laboratory period a week, first and second semesters. Prerequisite, consent of instructor. Carruthers.

#### FOR GRADUATES

The common prerequisites for the following courses are Chem. 187, 189, and 188, 190, or their equivalents.

One or more courses of the group, 281-307, will be offered each semester, depending on demand.

**Chem. 281, 283. Theory of Solutions (2, 2).** Two lectures a week, first and second semesters. Prerequisite, Chem. 307. Svirbely.

**Chem. 285. Colloid Chemistry (2).** Two lectures a week. Pickard.

**Chem. 287. Infra-red and Raman Spectroscopy (2).** Two lectures a week second semester. Prerequisites, Chem. 141, 143, 187, 189. Spurr.

**Chem. 289. Selected Topics in Advanced Colloid Chemistry (2).** Two lectures a week, first or second semester. Prerequisite, Chem. 285. Pickard.

**Chem. 295. Heterogenous Equilibria (2).** Two lectures a week. Pickard.

**Chem. 299. Reaction Kinetics (3).** Three lectures per week. Svirbely.

**Chem. 303. Electrochemistry (3).** Three lectures a week. Pickard.

**Chem. 304. Electrochemistry Laboratory (2).** Two three-hour laboratory periods a week. Prerequisite, consent of instructor. Staff.

**Chem. 307. Chemical Thermodynamics (3).** Three lectures a week. Svirbely.

**Chem. 311. Physicochemical Calculations (2).** Two lectures a week. Pickard.

**Chem. 313. Molecular Structure (2).** Two lectures a week, first semester. Brown.

**Chem. 315. Molecular Structure (2).** Two lectures a week, second semester. Prerequisite, Chem. 307. Spurr.

**Chem. 321. Quantum Chemistry (3).** Three lectures a week. Brown.

**Chem. 323. Statistical Mechanics and Chemistry (3)** Three lectures a week. Brown.

#### F. Seminar and Research

**Chem. 351. Seminar (1).** First and second semesters. Staff.

**Chem. 360. Research.** First and second semesters, summer session. Staff.

## CIVIL ENGINEERING

Professors Steinberg, Allen; Lecturer Walker; Associate Professors Barber, Gohr, Otts; Assistant Professors Cournyn, Keller, Piper, Wedding; Instructors Harden, Kennedy, Luce, Redd, Sunier.

The Civil Engineering Department offers graduate work in the following fields: highways, hydraulics, soils and foundations, structures, and sanitary engineering, leading to the degree of Master of Science.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- C. E. 100. **Theory of Structures (4).** Three lectures and one laboratory period a week, second semester. Prerequisite, M. E. 50. Allen, Piper.
- C. E. 101. **Soil Mechanics (3).** Two lectures and one laboratory period a week, first semester. Prerequisites, M. E. 50 and 53. Barber.
- C. E. 102. **Structural Design (6).** Five lectures and one laboratory period a week, first semester. Prerequisite, C. E. 100. Allen.
- C. E. 103. **Concrete Design (6).** Five lectures and one laboratory period a week, second semester. Prerequisite, C. E. 100. Allen.
- C. E. 104. **Water Supply (3).** Two lectures and one laboratory period a week, first semester. Prerequisite, C. E. 50. Otts.
- C. E. 105. **Sewerage (3).** Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 50. Otts.
- C. E. 106. **Elements of Highways (3).** Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 101. Barber, Gohr.
- C. E. 107. **Statically Indeterminate Structures (3, 3).** First and second semesters. Prerequisite, C. E. 100 or equivalent. Allen, Keller.
- C. E. 108. **Photogrammetry (3).** Two lectures and one laboratory period a week, second semester. Prerequisite, Surv. 100. Gohr.
- C. E. 109. **Hydrology (3).** Two lectures and one laboratory a week, first semester. Cournyn.

## FOR GRADUATES

- C. E. 200. **Advanced Properties of Materials (3).** First or second semester. Prerequisite, M. E. 53 or equivalent. Wedding.
- C. E. 201. **Advanced Strength of Materials (3).** First or second semester. Prerequisites, M. E. 50, 51 or equivalent. Keller.
- C. E. 202. **Experimental Stress Analysis (3).** Two lectures and one laboratory period a week, first or second semester. Keller.
- C. E. 203. **Soil Mechanics (3).** First or second semester. Prerequisite, C. E. 101 or equivalent. Barber.
- C. E. 204. **Advanced Foundations (3).** First or second semester. Prerequisites, C. E. 101, 102 and 103 or equivalent. Barber.

- C. E. 205. Highway Engineering (3). First or second semester. Prerequisite, C. E. 106 or equivalent. Barber, Gohr.
- C. E. 206. Theory of Concrete Mixtures (3, 3). First and second semesters. Prerequisite, M. E. 53 or equivalent. Walker.
- C. E. 207. Advanced Structural Analysis (3). Two lectures and one laboratory period a week, first semester. Prerequisites, C. E. 102, 103, or equivalent. Keller.
- C. E. 208. Advanced Sanitation (3). First or second semester. Otts.
- C. E. 209. Advanced Water Supply (3). First or second semester. Prerequisite, C. E. 104 or equivalent. Otts.
- C. E. 210. Advanced Sewerage (3). First or second semester. Prerequisite, C. E. 105 or equivalent. Otts.
- C. E. 211. Sanitary Engineering Design (3). First or second semester. Prerequisites, C. E. 104, 105 or equivalent. Otts.
- C. E. 212. Research. Credit in accordance with work done. First and second semesters. Staff.
- C. E. 213. Seminar. First or second semester. Credit in accordance with work outlined by the civil engineering staff. Staff.
- C. E. 214. Sanitary Engineering Laboratory (3). First or second semester. Prerequisite, C. E. 104 and C. E. 105 or equivalent. Otts.
- C. E. 215. Sanitary Engineering Laboratory (3). First or second semester. Prerequisite, C. E. 104 and C. E. 105 or equivalent. Otts.
- C. E. 216. Hydraulic Engineering (3). First or second semester. Prerequisite, C. E. 50 or equivalent. Cournyn.
- C. E. 217. Hydraulic Machinery (3). First or second semester. Prerequisite, C. E. 50 or equivalent. Cournyn.
- C. E. 218. Advanced Structural Design (3). Second semester. Prerequisite, C. E. 102, 103 or equivalent. Allen.
- C. E. 219. Sanitary Engineering Design (3). First or second semester. Prerequisite, C. E. 104, 105 or equivalent. Otts.
- C. E. 220. Soil Mechanics Laboratory (3). One lecture and two laboratory periods a week, first or second semester. Prerequisite, C. E. 101 or equivalent. Barber.

### COMPARATIVE LITERATURE

Professors Aldridge, Falls, Goodwyn, Harman, Murphy, Prahl, Zucker; Lecturer McManaway; Associate Professors Cooley, Manning, Mooney, Weber, Zeeveld; Assistant Professors Andrews, Gravely, Parsons.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Comp. Lit. 101. Introductory Survey of Comparative Literature (3). First semester. Zucker.

**Comp. Lit. 102. Introductory Survey of Comparative Literature (3).**  
Second semester. Zucker.

**Comp. Lit. 103. The Old Testament as Literature (3).** Second semester.  
Zucker.

**Comp. Lit. 105. Romanticism in France (3).** First semester. Parsons.

**Comp. Lit. 106. Romanticism in Germany (3).** Second semester. Prahl.

**Comp. Lit. 107. The Faust Legend in English and German Literature (3).**  
First semester. Prahl.

**Comp. Lit. 108. Some Non-English Influences on American Literature (3).**  
Second semester. Zucker.

**Comp. Lit. 112. Ibsen (3).** First semester. Zucker.

**Comp. Lit. 114. The Greek Drama (3).** First semester. Prahl.

**Comp. Lit. 125. Literature of the Middle Ages.** Cooley.

In addition, the following courses will count as credit in Comparative Literature: Eng. 104, Eng. 113, Eng. 121, Eng. 129, 130, Eng. 144, Eng. 145, Eng. 155, 156, Eng. 157; Span. 109; Speech 131, 132.

#### FOR GRADUATES

**Comp. Lit. 258. Folklore in Literature (3).** Second semester. Goodwyn.

The following courses will count as credit in Comparative Literature: Eng. 201, Eng. 204, Eng. 206, 207, Eng. 216, 217, Eng. 227, 228; Ger. 203, Ger. 204, Ger. 208.

#### DAIRY

Professors Cairns, Shaw, Arbuckle; Assistant Professors Mattick, Keeney;  
Instructors Ellmore, Nisonger.

The Dairy Department offers work leading to degrees of Master of Science and Doctor of Philosophy. Candidates for the Doctor of Philosophy degree have the option of studying in one of two major fields: Dairy Production, which is concerned with breeding, nutrition and physiology of dairy animals, or Dairy Technology, which is concerned with the chemical, bacteriological and nutritional aspects of dairy products, as well as the practical industrial phases of milk processing. Doctoral candidates must satisfactorily complete the following work, or its equivalent, in courses carrying graduate credit: Bacteriology, to include Dairy, Food, Pathogenic and Bacterial Metabolism (14 hours); Chemistry, to include Organic, Biological, Physical and Colloidal (18 hours); Nutrition (8 hours). In addition, doctoral candidates majoring in Dairy Production must have a minimum of 12 hours in physiology.

**Dairy 101. Dairy Production (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, Dairy 1 and A. H. 110.

(———.)

- Dairy 105. Dairy Cattle Breeding (3).** Two lectures and one laboratory period a week, first semester. Prerequisites, Dairy 1, Zool. 104 and A. H. 120. (———, Ellmore.)
- Dairy 108. Dairy Technology (4).** Two lectures and two laboratory periods a week, first semester. Prerequisites, Dairy 1, Bact. 133, Chem. 1, 3. Laboratory fee, \$3.00. Mattick.
- Dairy 109. Market Milk (4).** Two lectures and two laboratory periods a week, second semester. Prerequisites, Dairy 1, Bact. 133, Chem. 1, 3. Laboratory fee, \$3.00. Arbuckle, Nisonger.
- Dairy 110. Butter and Cheese Making (3).** One lecture and one five-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Prerequisites, Dairy 1, Bact. 1, Chem. 1, 3. (Alternate years, not given in 1951-1952.) Mattick.
- Dairy 111. Concentrated Milk Products (3).** One lecture and one five-hour laboratory period a week, second semester. Prerequisites, Dairy 108, 114. (Alternate years, not given in 1951-1952.) Laboratory fee, \$3.00. Mattick.
- Dairy 112. Ice Cream Making (4).** Two lectures and two laboratory periods a week, first semester. Laboratory fee, \$3.00. Prerequisites, Dairy 108. Arbuckle, Nisonger.
- Dairy 114. Special Laboratory Methods (4).** Two lectures and two laboratory periods a week, second semester. Prerequisites, Dairy 108, Bact. 133, Chem. 19, 31, 32, 33, 34. Laboratory fee, \$3.00. Keeney.
- Dairy 201. Advanced Dairy Production (3).** First semester. Prerequisite, Dairy 101, or equivalent. (———.)
- Dairy 202. Advanced Dairy Technology (3).** First semester. Prerequisites, Dairy 108, 114, or equivalent. Kenney.
- Dairy 203. Physiology of Milk Secretion (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, A. H. 111, and consent of instructor. Shaw.
- Dairy 204. Special Problems in Dairying (1-5).** First and second semesters. Prerequisite, permission of professor in charge of work. Staff.
- Dairy 205. Seminar (1).** First and second semesters. Staff.
- Dairy 206. Animal Nutrition Seminar (1).** Second semester. Prerequisites, permission of instructor. Shaw.
- Dairy 208. Research (3-8).** Credit to be determined by amount and quality of work done. Staff.

## ECONOMICS

Professors Ratzlaff, Dillard, Gruchy; Assistant Professor Cole; Instructors Hamill, Hilton, Measday, Norton, Root, Robinson.

This Department offers both the Master of Arts and the Doctor of Philosophy degrees. The latter degree is offered in collaboration with the Department of Business Administration, and prospective doctoral students should consult with both that Department and the Department of Economics in planning their courses of study.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Econ. 131. Comparative Economic Systems (3).** Second semester. Prerequisite, Econ. 32 or 37. Gruchy.
- Econ. 132. Advanced Economic Principles (3).** First semester. Prerequisite, Econ. 32. Gruchy.
- Econ. 134. Contemporary Economic Thought (3).** Second semester. Prerequisite, Econ. 32. Gruchy.
- Econ. 136. International Economic Policies and Relations (3).** First semester. Prerequisite, Econ. 32 or 37. Ratzlaff.
- Econ. 137. The Economics of National Planning (3).** Second semester. Prerequisite, Econ. 32 or 37. Gruchy.
- Econ. 140. Money and Banking (3).** First and second semesters.. Prerequisite, Econ. 32 or 37. Staff.
- Econ. 141. Theory of Money, Credit, and Prices (3).** Second semester. Prerequisites, Econ. 32 and 140. Dillard.
- Econ. 142. Public Finance and Taxation (3).** First semester. Prerequisite, Econ. 32 or 37. Ratzlaff.
- Econ. 149. International Finance and Exchange (3).** Second semester. Prerequisite, Econ. 140. Econ. 136 and 141 recommended. Ratzlaff.
- Econ. 150. Marketing Principles and Organization (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Staff.
- Econ. 151. Economics of Cooperatives (2).** Second semester. Prerequisite, Econ. 32 or 37.
- Econ. 160. Labor Economics (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Staff.
- Econ. 170. Monopoly and Competition (3).** Second semester. Prerequisite, Econ. 32 or 37.
- Econ. 171. Economics of American Industries (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Clemens.



## FOR GRADUATES

- Econ. 230.** History of Economic Thought (3). First semester. Prerequisite, Econ. 132 or consent of instructor. Dillard.
- Econ. 231.** Economic Theory in the Nineteenth Century (3). Second semester. Prerequisite, Econ. 230 or consent of instructor. Dillard.
- Econ. 232, 233.** Seminar in Economic Theory (3, 3). First and second semesters. Prerequisite, Econ. 132 or consent of instructor. Gruchy.
- Econ. 235.** Seminar in International Economic Relations (3).
- Econ. 237.** Seminar in Economic Investigation (3). First semester. Ratzlaff.
- Econ. 270.** Seminar in Economics and Geography of American Industries (3). Clemens.
- Econ. 299.** Thesis. Arranged. Staff.

## EDUCATION

Professors Benjamin, Brechbill, Brown, Cotterman, Dildine, Hornbake, McNaughton, Morgan, Newell, Prescott, Schindler, Van Zwoll, Wiggin; Associate Professors Caldwell, Kurtz, Mershon, Patrick, Wall; Assistant Professors Beatty, Bryan, Hufstedler, Maley, Perkins, Spencer, Waetjen, Weber; Instructors Denecke, Flannery, Kemble, Stewart.

The Department of Education offers Graduate School programs leading toward the Master of Arts, Master of Education, Doctor of Philosophy, and Doctor of Education degrees.

## MASTER OF ARTS AND MASTER OF EDUCATION

A student in Education has the option of qualifying for the degree of Master of Arts or for the degree of Master of Education.

In addition to the general requirements for admission to the Graduate School, applicants for unconditional admission with a major in Education must have had sixteen semester hours of undergraduate work in Education of acceptable quality, equivalent in character to the work required in the junior and senior years of the University of Maryland. The Education Committee on Masters' Programs may interpret this requirement so that foundation work in fields other than education may be accepted in cases of graduate students not preparing for school work.

The time limit for completing either degree is the same as that prescribed for the Master of Arts and the Master of Science degrees of the Graduate School.

A qualifying written examination is required of all candidates for a degree, to be taken after the student has successfully completed at least 12 semester hours of satisfactory graduate work. This examination covers

the student's major area of work for the degree. Following is a list of the areas in which this examination may be taken:

Adult Education	Higher Education
Business Education	History and Philosophy of Education
Comparative Education	Home Economics Education
Educational Administration and Supervision	Secondary School Teaching and Curriculum
Elementary School Curriculum and Teaching	Human Growth and Development
Guidance and Personnel	Industrial Arts Education
Health, Physical Education, and Recreation	Nursery School Education
	Nursing Education
	Vocational Industrial Education

To assist in the choice of reading in preparation for the examination, reading lists in the several areas are available from the professor in charge of the area. No student is recommended to the Graduate Council for advancement to candidacy until he has successfully passed the qualifying examination. Currently the examination is administered on the third Saturday of January and May and on the Saturday preceding the last week of the Summer Session at College Park only.

Candidates for the degree of Master of Education who are high school teachers not preparing for administrative positions are advised to take at least 12 semester hours in their subject fields. Students who desire to qualify for a secondary school principalship in Maryland should take one-third of their graduate work in fields other than education.

#### DOCTOR OF PHILOSOPHY AND DOCTOR OF EDUCATION

Each candidate is required to achieve exceptional ability in at least one major area and one minor area of competence. The minor may consist of a single area or of a group of related courses. Areas related to the major and minor may be included also if desired. The choice of specific areas is optional with the student and his faculty adviser.

The areas of specialization in education from which a student may select his major, his minor, and the related areas of competence, are as follows:

Adult Education	History, Philosophy, and Comparative Education
Curriculum and Instruction	Home Economics Education
Educational Administration and Supervision	Human Growth and Development
Elementary Education	Industrial Arts Education
Guidance and Personnel	Nursery School Education
Health and Physical Education	Research Principles and Techniques
Higher Education	Secondary Education
	Vocational Industrial Education

In addition to the general University requirements for a Doctor's degree the following additional requirements must be met by students proposing to major in one of the above fields.

1. The preliminary examination for admission to candidacy for the Doctor's degree will cover the student's preparation in major and minor fields, and will include such other examinations as may be required by the faculty. A student must be admitted to candidacy in order to have the department's official permission to be a candidate for a Doctor's degree.

2. A comprehensive examination covering the general fields of major and minor study must be passed by each candidate, after which the final examination is administered by a committee appointed by the Dean of the Graduate School.

3. In order to meet the residence requirements, a candidate for the Ph. D. degree must spend at least two semesters in full-time study on the College Park campus.

In general the requirements for the Doctor of Education degree are the same as those for the degree Doctor of Philosophy. The most important difference between the two degrees are as follows:

1. The purpose of the Doctor of Education degree is to prepare persons of exceptional competence to work in the field. The emphasis for this degree is placed on broad understanding, whereas that for the degree of Doctor of Philosophy is placed on specialized research.

2. A reading knowledge of foreign languages is required for the degree of Doctor of Education only when needed for research and study in the doctoral program.

3. In meeting residence requirements, a candidate for the Ed.D. degree may substitute two summers of residence for one semester of residence, or four summers for two semesters.

4. The doctoral study for the Ed.D. consists of a project rather than a dissertation. The project requires research to meet a practical field problem. Credit of six to nine hours is allowed for a project as compared with twelve to eighteen hours for a Ph.D. dissertation.

#### A. History, Principles, Curriculum, and Administration

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- |          |   |           |
|----------|---|-----------|
| Ed. 100. | History of Education I (2). First semester.                     | Wiggin.   |
| Ed. 101. | History of Education II (2).                                    | Wiggin.   |
| Ed. 102. | History of Education in the United States (2). Second semester. | Wiggin.   |
| Ed. 105. | Comparative Education—European (2). First semester.             | Benjamin. |
| Ed. 106. | Comparative Education—Latin America (2). Second semester.       | Benjamin. |

- Ed. 107. Philosophy of Education I (2). Benjamin.
- Ed. 108. Philosophy of Education II (2). Benjamin.
- Ed. 110. The Teacher and School Administration (2).
- Ed. 121. The Language Arts in the Elementary School (2).
- Ed. 122. The Social Studies in the Elementary School (2).
- Ed. 123. The Child and the Curriculum (2).
- Ed. 124. Creative Expression in the Elementary School (2).
- Ed. 125. Creative Expression in the Elementary School II (2). Prerequisite, Ed. 124 or taken concurrently.
- Ed. 126. The Elementary School Curriculum (2).
- \*Ed. 130. Theory of the Junior High School (2). Newell.
- \*Ed. 131. Theory of the Senior High School (2). Newell.
- Ed. 133. Methods of Teaching the Social Studies (2). Offered in Baltimore.
- Ed. 134. Materials and Procedures for the Senior High School Core Curriculum (2).
- Ed. 137. Science in the Junior High School (2). Laboratory fee, \$2.00.
- Ed. 140. Curriculum, Instruction, and Observation (3). Second semester. Staff.
- Graduate credit is allowed only by special permission. Separate sections are offered in the following subject-matter areas: English, Social Studies, Foreign Languages, Science, Mathematics, Art Education, Business Education, Industrial Education, Music Education, Nursing Education, Physical Education for Men, and Physical Education for Women.
- Ed. 141. High School Course of Study—English (2). Bryan.
- Ed. 142. High School Course of Study—Literature (2). Bryan.
- Ed. 144. Materials and Procedure for the Junior High School Core Curriculum (2).
- Ed. 145. Principles of High School Teaching (2). First and second semesters. Brechbill.
- Ed. 146. The Teaching of Physics (3). Second semester. Laboratory fee, \$6.00. R. Morgan.
- Ed. 147. Audio-Visual Education (2). First semester. Laboratory fee, \$1.00. Brechbill.

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\* Credit is accepted for Ed. 130 or for Ed. 131, but not for both courses.

- Ed. 150. Educational Measurement (2). First and second semesters.  
Brechtbill.
- Ed. 151. Remedial Reading Instruction (2).  
Schindler.
- Ed. 152. The Adolescent: Characteristics and Problems (2).
- Ed. 153. The Improvement of Reading (2).  
Schindler.
- Ed. 160. Educational Sociology—Introductory (2). First and second semesters.  
Schindler.
- Ed. 161. Guidance in Secondary Schools (2).
- Ed. 162. Mental Hygiene in the Classroom (2).
- Ed. 163, 164, 165. Community Study Laboratory I, II and III (2, 2, 2,).
- Ed. 170. Introduction to Special Education (2).
- Ed. 171. Education of Retarded and Slow-Learning Children (2).
- Ed. 191. Principles of Adult Education (2).  
Wiggin.
- Ed. 195. Teaching Traffic Safety and Automobile Operation (2). Offered in Summer School. Laboratory fee, \$3.00.

## FOR GRADUATES

- Ed. 202. The Junior College (2).  
Benjamin.
- Ed. 203. Problems in Higher Education (2).  
Benjamin.
- Ed. 205. Seminar in Comparative Education (2).  
Benjamin.
- Ed. 207. Seminar in Philosophy of Education (2).  
Benjamin, Wiggin.
- Ed. 209. Seminar in History of Education (2).  
Wiggin.
- Ed. 210. The Organization and Administration of Public Education (2).  
First semester.  
Newell.
- Ed. 211. The Organization, Administration, and Supervision of Secondary Schools (2). Second semester.  
Newell.
- Ed. 212. School Finance and Business Administration (2).  
VanZwoll.
- Ed. 213. Administration and Teaching in Junior High School (2).
- Ed. 214. School Buildings and Equipment (2).  
VanZwoll.
- Ed. 215. Public Education in Maryland (2).  
Newell.
- Ed. 216. High School Supervision (2). Laboratory fee, \$1.00.  
Newell.
- Ed. 217. Administration and Supervision in Elementary Schools (2).
- Ed. 218. School Surveys (2-6).  
Newell.
- Ed. 219. Seminar in School Administration (2).  
VanZwoll.
- Ed. 220. Pupil Transportation (2).

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|---|------------|
| Ed. 221. Functional School Plant Planning (2).  | VanZwoll.  |
| Ed. 222. Seminar in Supervision (2).  | Newell.    |
| Ed. 223. Practicum in Personnel Relationships (2-6).  | Newell.    |
| Ed. 224. Internship in School Administration (12-16).                                       | Newell.    |
| Ed. 225. School Public Relations (2).   | VanZwoll.  |
| Ed. 226. Child Accounting (2).  | VanZwoll.  |
| Ed. 227. Public School Personnel Administration (2).  | VanZwoll.  |
| Ed. 228. The Beginning School Principal (2).  | Newell.    |
| Ed. 229. Seminar in Elementary Education (2).   | Schindler. |
| Ed. 232. Student Activities in the High School (2).   |            |
| Ed. 236. Curriculum Development in the Secondary School (2).                                |            |
| Ed. 239. Seminar in Secondary Education (2).  |            |
| Ed. 242. Coordination in Work-Experience Programs (2).                                      | Brown.     |
| Ed. 243. Application of Theory and Research to Arithmetic in Elementary Schools (2).        | Schindler. |
| Ed. 244. Application of Theory and Research to the Language Arts in Elementary Schools (2). | Schindler. |
| Ed. 245. Applications of Theory and Research to High School Teaching (2).                   | Brechbill. |
| Ed. 247. Seminar in Science Education (2).  |            |
| Ed. 248. Seminar in Vocational Education (2).   | Hornbake.  |
| Ed. 250. Analysis of the Individual (2). Second semester.                                   |            |
| Ed. 261. Counseling Techniques (2).   |            |
| Ed. 262. Occupational Information (2). Second semester.                                     |            |
| Ed. 263, 264. Aptitudes and Aptitude Testing (2, 2). Offered in Baltimore.                  |            |
| Ed. 267. Curriculum Construction Through Community Analysis (2).                            | Schindler. |
| Ed. 268. Seminar in Educational Sociology (2).  | Schindler. |
| Ed. 269. Seminar in Guidance (2).   |            |
| Ed. 278. Seminar in Special Education (2).  |            |
| Ed. 279. Seminar in Adult Education (2).  | Wiggin.    |
| Ed. 280. Research Methods and Materials in Education (2).                                   |            |
| Ed. 281. Source Materials in Education (2).   |            |

- Ed. 288. Research Problems in Education (1-6). First and second semesters. Staff.
- Ed. 289. Research—Thesis (1-6). First and second semesters.. Staff.
- Ed. 291. Administrative Direction of Special Curricular Fields (2).
- Ed. 292. Advanced Creative Art Expression in Elementary Schools (2). Prerequisite, Ed. 124 or 125. Summer School.

### B. Business Education

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- B. Ed. 101. Methods and Materials in Teaching Office Skills (2).
- B. Ed. 102. Methods and Materials in Teaching Bookkeeping and Related Subjects (2).
- B. Ed. 103. Basic Business Subjects in the Junior High School (2).
- B. Ed. 104. Basic Business Education in the Secondary Schools (2).
- B. Ed. 160. Curriculum Building for Work Experience Programs (2).
- B. Ed. 162. Methods of Teaching in the Part-time Cooperative (Distributive Education) Program (2).
- B. Ed. 165. Organization and Operation of the Part-time Cooperative (Distributive Education) Program (2).
- B. Ed. 180. Merchandise Information for the Distributive Education Co-ordinator (2).

#### FOR GRADUATES

- B. Ed. 200. Administration and Supervision of Business Education (2).
- B. Ed. 255. Principles and Problems of Business Education (2). Patrick.
- B. Ed. 256. Curriculum Development in Business Education (2-6).  
Greene.

### C. Home Economics Education

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- H. E. Ed. 102. Problems in Teaching Home Economics (3). First semester. Spencer.
- H. E. Ed. 120. Evaluation of Home Economics (2). Spencer.
- H. E. Ed. 140. Curriculum, Instruction, and Observation (3) Second semester. Spencer.

#### FOR GRADUATES

- H. E. Ed. 200. Seminar in Home Economics Education (2). Spencer.
- H. E. Ed. 202. Trends in the Teaching and Supervision of Home Economics (2-4). Spencer.

**D. Human Development Education****FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- H. D. Ed. 100, 101. Principles of Human Development I and II (3, 3).  
 H. D. Ed. 102, 103, 104. Child Development Laboratory I, II and III.  
 H. D. Ed. 112, 114, 116. Scientific Concepts in Human Development I, II, III (3, 3, 3).  
 H. D. Ed. 113, 115, 117. Laboratory in Behavior Analysis I, II, III (3, 3, 3).

**FOR GRADUATES**

- H. D. Ed. 200. Introduction to Human Development and Child Study (3).  
 H. D. Ed. 201. Biological Bases of Behavior (3).  
 H. D. Ed. 202. Cultural Bases of Behavior (3).  
 H. D. Ed. 203. Integrative Bases of Behavior (3).  
 H. D. Ed. 204, 205. Physical Processes in Human Development (3, 3).  
 H. D. Ed. 206, 207. Socialization Processes in Human Development I, II (3, 3).  
 H. D. Ed. 208, 209. Self Processes in Human Development I and II (3, 3).  
 H. D. Ed. 210. Affectional Relationships and Processes in Human Development (3).  
 H. D. Ed. 211. Peer-culture and Group Processes in Human Development (3).  
 H. D. Ed. 212, 214, 216. Advanced Scientific Concepts in Human Development I, II, III (3, 3, 3).  
 H. D. Ed. 213, 215, 217. Advanced Laboratory in Behavior Analysis I, II, III (3, 3, 3).  
 H. D. Ed. 220. Developmental Tasks (3).  
 H. D. Ed. 230, 231. Field Program in Child Study I and II (2-6).  
 H. D. Ed. 250a, 250b, 250c. Direct Study of Children (1, 1, 1).  
 H. D. Ed. 260. Synthesis of Human Development Concepts (3).  
 H. D. Ed. 270. Seminars in Special Topics in Human Development (2-6).

**E. Industrial Education****FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- Ind. Ed. 105. General Shop (2). Second semester Laboratory fee, \$5.00.  
 Ind. Ed. 140. Curriculum, Instruction, and Observation (3). First semester.  
 Ind. Ed. 141, 142. Industrial Safety Education I (2, 2).



- Ind. Ed. 143, 144. Industrial Safety Education II—Advanced (2, 2).  
 Ind. Ed. 145, 146. Industrial Hygiene Education (2, 2).  
 Ind. Ed. 150. Training Aids Development (2). Second semester. Wall.  
 Ind. Ed. 157. Tests and Measurements (2).  
 Ind. Ed. 161. Principles of Vocational Guidance (2).  
 Ind. Ed. 164. Shop Organization and Management (2). Second semester. Wall.  
 Ind. Ed. 165. Modern Industry (3). Summer Session.  
 Ind. Ed. 166. Educational Foundations of Industrial Arts (2). First semester. Brown, Hornbake.  
 Ind. Ed. 167. Problems in Occupational Education (2). Offered in Baltimore.  
 Ind. Ed. 168. Trade or Occupational Analysis (2). First semester.  
 Ind. Ed. 169. Course Construction (2).  
 Ind. Ed. 170. Principles of Vocational Education (2). Summer session.  
 Ind. Ed. 171. History of Vocational Education (2). Summer session.

## FOR GRADUATES

- Ind. Ed. 207. Philosophy of Industrial Arts Education (2). First semester. Hornbake.  
 Ind. Ed. 214. School Shop Planning and Equipment Selection (2). Second semester. Hornbake.  
 Ind. Ed. 216. Supervision of Industrial Arts (2). Second semester. Hornbake.  
 Ind. Ed. 220. Organization, Administration, and Supervision of Vocational Education (2).  
 Ind. Ed. 240. Research in Industrial Arts and Vocational Education (2). First and second semesters. Staff.  
 Ind. Ed. 241. Content and Method of Industrial Arts (2). Second semester. Hornbake.  
 Ind. Ed. 248. Seminar in Industrial Arts and Vocational Education (2).

## F. Nursery School-Kindergarten Education

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- C. Ed. 100. Child Development I—Infancy (3). First semester. McNaughton.  
 C. Ed. 101. Child Development II—Early Childhood (3). Second semester. McNaughton.

- C. Ed. 102. Child Development III—The Child from 5 to 10 (2). First and second semesters.
- C. Ed. 110. Child Development IV (3). First and second semesters. Laboratory fee, \$1.00.
- C. Ed. 112. Play and Play Materials (2). Flannery.
- C. Ed. 113. Education of the Young Child I (2). McNaughton.
- C. Ed. 114. Education of the Young Child II—The Social and Emotional Needs of the Young Child (2). McNaughton.
- C. Ed. 115. Children's Activities and Activities Materials (3). Second semester.
- C. Ed. 116, 117. Creative Expressions; Art, Music, Dance (2-3, 2-3).
- C. Ed. 119. Curriculum, Instruction, and Observation—Cooperative Nursery School (2-3).
- C. Ed. 140. Curriculum, Instruction, and Observation—Nursery School (3). First and second semesters.
- C. Ed. 145. Guidance in Behavior Problems (2). First semester.
- C. Ed. 150. Curriculum, Instruction, and Observation—Kindergarten (2-3). Second semester.
- C. Ed. 160. Speech Problems in Child Development (2).
- C. Ed. 161. Behavior Problems of Childhood and Adolescence (2).
- C. Ed. 165. Leadership Training (2).

### G. Nursing Education

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- N. Ed. 112. School of Nursing Finance and Administration (3). Offered in Baltimore.
- N. Ed. 115, 116. Ward Management and Clinical Teaching (2, 2). Offered in Baltimore.
- N. Ed. 117. Newer Trends in Nursing Service (2). Offered in Baltimore.
- N. Ed. 190. Principles of Pediatric Nursing (3). Offered in Baltimore.

### ELECTRICAL ENGINEERING

Professors Corcoran, Reed, Weber; Lecturers Ahrendt, Freeman, Stuntz; Associate Professors Hodgins, Wagner, Small; Assistant Professors Price, Simons, Becker; Instructors Beam, Thompson.

Electromagnetic Waves, E. E. 120, is required of all candidates for the Master of Science degree in electrical engineering unless the candidate has had a comparable undergraduate course. Electromagnetic Theory,

E. E. 201, is required of all candidates unless permission for an appropriate substitution is granted.

A written qualifying examination is required of all candidates for the Master's degree in electrical engineering. This examination will be held Saturday, October 13, 1951. Off-campus and part-time students must have satisfactorily completed a minimum of nine semester hours of graduate course work before being admitted to the written qualifying examination. Full-time students having less than nine semester hours of graduate course work are permitted to take this examination by special arrangement. The student must have been admitted to the graduate school before taking this examination.

Part-time students working toward the Master of Science degree in electrical engineering must take a minimum of six semester hours of course work from resident professors of electrical engineering. Part-time students working toward the Doctor of Philosophy degree must take a minimum of twenty-four semester hours of course work from resident professors.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- E. E. 100. Alternating-Current Circuits (4). Three lectures and one laboratory period a week, first semester. Laboratory fee, \$4.00. Prerequisites, Math. 21, Phys. 21, and E. E. 1. Hodgins, Price.
- E. E. 100b. Alternating-Current Circuits (3). Three lectures a week. Prerequisites, Math. 21, Phys. 21, E. E. 1. Reed.
- E. E. 101. Engineering Electronics (4). Three lectures and one laboratory period a week, second semester. Laboratory fee, \$4.00. Prerequisite, E. E. 100. Price.
- E. E. 101b. Engineering Electronics (3). Three lectures a week. Prerequisite, E. E. 100 or E. E. 100b. Reed.
- E. E. 102, 103. Alternating-Current Machinery (4, 4). Three lectures and one laboratory period a week, first and second semesters. Laboratory fee \$4.00. Prerequisites, E. E. 65 and E. E. 100. Hodgins.
- E. E. 104. Communication Circuits (3). Three lectures a week, second semester. Prerequisites, E. E. 60 and E. E. 100. Reed.
- E. E. 105, 106. Radio Engineering (4, 4). Three lectures and one laboratory period a week, first and second semesters. Laboratory fee, \$4.00. Prerequisite, E. E. 101. Wagner.
- E. E. 108. Electric Transients (3). Three lectures a week, second semester. Prerequisite, E. E. 101. Corcoran, Reed.
- E. E. 109. Principles of Radar (3). Three lectures a week, second semester. Prerequisite, E. E. 105. Stuntz.
- E. E. 114. Applied Electronics (3). Three lectures a week, first semester. Prerequisite, E. E. 101. Stuntz.

- E. E. 116. Alternating-Current Machinery Design (3). Two lectures and one calculation period a week, second semester. Prerequisite, concurrent registration in E. E. 103. Reed.
- E. E. 117. Power Transmission and Distribution (3). Three lectures a week, first semester. Prerequisite, concurrent registration in E. E. 102. Reed.
- E. E. 120. Electromagnetic Waves (3). Three lectures a week, first semester. Required of M. S. degree candidates in electrical engineering. Reed.
- E. E. 160, 161. Vacuum Tubes (3, 3). Three lectures a week, first and second semesters. Weber.

## FOR GRADUATES

- E. E. 200. Symmetrical Components (3). Three lectures a week, first semester. Prerequisite, E. E. 103. Reed.
- E. E. 201. Electromagnetic Theory (3). Three lectures a week, second semester. Prerequisite, E. E. 120. Required of M. S. degree candidates in electrical engineering. Weber.
- E. E. 202, 203. Transients in Linear Systems (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Required of M. S. degree candidates in electrical engineering. Wagner.
- E. E. 204, 205. Advanced Circuit Analysis (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical engineering or physics. Reed.
- E. E. 206, 207. Ultra-High-Frequency Techniques (3, 3). Three lectures a week, first semester; two lectures and one laboratory period a week, second semester. Laboratory fee, second semester, \$4.00. Prerequisite, E. E. 201. (Not offered 1951-1952.) Weber.
- E. E. 209. Stability in Power Systems (3). Three lectures a week, second semester. Prerequisite, E. E. 200. Reed.
- E. E. 210, 211. Advanced Radio Engineering (3, 3). Three lectures a week, first and second semesters. Prerequisite, E. E. 106. Davies.
- E. E. 212, 213. Automatic Regulation (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Ahrendt.
- E. E. 215, 216. Radio Wave Propagation (3, 3). Three lectures a week, first and second semesters. Prerequisite, E. E. 120. (Not offered 1951-1952.) Katzin.
- E. E. 222 Graduate Seminar (1). First semester. Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Graduate Staff.

- E. E. 232. Active Network Analysis (3).** Three lectures a week, first semester. Prerequisite, E. E. 202 or E. E. 204. Corcoran.
- E. E. 233. Network Synthesis (3).** Three lectures a week, second semester. Prerequisite, E. E. 232. Corcoran.
- E. E. 235. Applications of Tensor Analysis (3).** Three lectures a week, second semester. Prerequisite, E. E. 202. (Not offered 1951-1952.) Wagner.
- E. E. 250 Electrical Engineering Research.** Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Six semester hours are required of M.S. degree candidates and a minimum of 18 semester hours are required of Ph.D. candidates. Graduate Staff.

### ENGLISH LANGUAGE AND LITERATURE

Professors Aldridge, Bode, Harman, Murphy; Lecturer McManaway; Associate Professors Ball, Cooley, Manning, Mooney, Weber, Zeeveld; Assistant Professors Andrews, Coulter, Fleming, Gravely, Schaumann, Ward; Instructors Adams, Anderson, apRoberts, Barnes, Bauer, Beall, Bezanson, Demaree, Dinwiddle, Fischer, Kahn, Lutwack, Mangold, C. P. Martin, M. Martin, Miller, Mish, Portz, Robison, Seligman, Shaw, Stone, Swarthout.

#### MASTER OF ARTS

1. Students must demonstrate a reading knowledge of a foreign language before they will be recommended for admission to candidacy. A choice of French or German is recommended, but in exceptional cases another language may be substituted by special permission of the Department.
2. Candidates must pass a final written examination covering the English language and the whole course of English and American literature.

#### DOCTOR OF PHILOSOPHY

1. Students must demonstrate a reading knowledge of German and French before they will be permitted to take the preliminary qualifying examination.
2. A preliminary qualifying examination must be passed before students will be recommended for admission to candidacy. Students are expected to take this examination by the time they have completed a full year of residence beyond the Master of Arts requirements.
3. Candidates must pass a comprehensive written examination covering linguistics and the whole course of English and American literature.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Eng. 101. History of the English Language (3).** Second semester. Harman.
- Eng. 102. Old English (3).** First semester. Ball.

- Eng. 103. *Beowulf* (3). Second semester Ball.
- Eng. 104. *Chaucer* (3). First semester. Harman.
- Eng. 106. *English and Scottish Ballads* (3). (Not offered 1951-1952.) Cooley.
- Eng. 110, 111. *Elizabethan and Jacobean Drama* (3, 3). (Not offered 1951-1952.) Zeeveld.
- Eng. 112. *Poetry of the Renaissance* (3). First semester. Zeeveld.
- Eng. 113. *Prose of the Renaissance* (3). Second semester. Zeeveld.
- Eng. 115, 116. *Shakespeare* (3, 3). First and second semesters. Zeeveld.
- Eng. 120. *English Drama from 1660 to 1800* (3). Second semester. Weber.
- Eng. 121. *Milton* (3). Second semester. Murphy.
- Eng. 122. *Literature of the Seventeenth Century, 1600-1660* (3). First semester. Murphy.
- Eng. 123. *Literature of the Seventeenth Century, 1660-1700* (3). Second semester. Aldridge.
- Eng. 125, 126. *Literature of the Eighteenth Century* (3, 3). (Not offered 1951-1952.) Aldridge.
- Eng. 129, 130. *Literature of the Romantic Period* (3, 3). First and second semesters. Weber.
- Eng. 134, 135. *Literature of the Victorian Period* (3, 3). First and second semesters. Cooley, Mooney.
- Eng. 139, 140. *The English Novel* (3, 3). First and second semesters. Aldridge, Mooney.
- Eng. 143. *Modern Poetry* (3). First semester. Murphy.
- Eng. 144. *Modern Drama* (3). First semester. Weber.
- Eng. 145. *The Modern Novel* (3). Second semester. Andrews.
- Eng. 148. *The Literature of American Democracy* (3). First semester. Manning.
- Eng. 150, 151. *American Literature to 1900* (3, 3). First and second semesters. Gravely, Manning.
- Eng. 155, 156. *Four Major American Writers* (3, 3). First and second semesters. Manning, Gravely.
- Eng. 157. *Introduction to Folklore* (3). First semester. Cooley.
- Eng. 170. *Creative Writing* (2). First semester. Prerequisite, permission of the instructor. Fleming.

- Eng. 171. Advanced Creative Writing (2). Second semester. Prerequisite, permission of the instructor. Fleming.
- Eng. 172. Playwriting (2). Second semester. Prerequisite, permission of the instructor. Fleming.
- Amer. Civ. 137, 138. Conference Course in American Civilization (3, 3). First and second semesters. Bode.

## FOR GRADUATES

- Eng. 200. Research (3-6). Arranged. Staff.
- Eng. 201. Bibliography and Methods (3). First semester. Mooney.
- Eng. 202. Middle English (3). First semester. Harman.
- Eng. 203. Gothic (3). Second semester. Harman.
- Eng. 204. Medieval Romances (3) Second semester. Cooley.
- Eng. 206, 207. Seminar in Renaissance Literature (3, 3). First and second semesters. McManaway.
- Eng. 210. Seminar in Seventeenth Century Literature (3). Not offered 1951-1952. Murphy.
- Eng. 212, 213. Seminar in Eighteenth Century Literature (3, 3). Not offered 1951-1952. Aldridge.
- Eng. 214, 215. Seminar in Nineteenth Century Literature (3, 3). First and second semesters. Cooley, Mooney.
- Eng. 216, 217. Literary Criticism (3, 3). First and second semesters. Murphy.
- Eng. 225, 226. Seminar in American Literature (3, 3). First and second semesters. Bode.
- Eng. 227, 228. Problems in American Literature (3, 3). First and second semesters. Aldridge.
- Eng. 230. Studies in American Language (3). Not offered 1951-1952.

## ENTOMOLOGY

Professors Cory, Langford; Lecturers Munson, Sailer, Shepard; Associate Professors Bickley, Bissell, Ditman, McConnell; Assistant Professors Abrams, Haviland.

The Department of Entomology offers work toward the degrees of Master of Science and Doctor of Philosophy.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Ent. 100. Advanced Apiculture (3). One lecture and two three-hour laboratory periods a week, second semester. Prerequisite, Ent. 4. Laboratory fee, \$3.00 Abrams.

- Ent. 101. **Economic Entomology (3).** Not offered 1951-1952.
- Ent. 103, 104. **Insect Pests (3, 3).** Two lectures and one three-hour laboratory period a week, first and second semesters. Prerequisite, Ent. 1 or consent of the Department. Laboratory fee, \$3.00. Cory.
- Ent. 105. **Medical Entomology (3).** Two lectures and one two-hour laboratory period a week, first semester. Prerequisite, Ent. 1 or consent of the Department. Laboratory fee, \$3.00. Bickley.
- Ent. 106. **Advanced Insect Taxonomy (3).** Two three-hour laboratory periods a week, first semester. Prerequisite, Ent. 3. Laboratory fee, \$3.00. Bickley.
- Ent. 107. **Insecticides (2).** Second semester. Prerequisites, Ent. 1 and elementary organic chemistry. Shepard.
- Ent. 109. **Insect Physiology (2).** Two lectures and occasional demonstrations, second semester. Prerequisite, consent of the Department. Munson.
- Ent. 110, 111. **Special Problems (1, 1).** First and second semesters. Prerequisites, to be determined by the Department. Cory and Staff.
- Ent. 112. **Seminar (1).** First and second semesters. Cory and Staff.
- Ent. 113. **Entomological Literature (1).** Second semester. Bickley.
- Ent. 114. **Insect Pests of Greenhouses (3).** Two lectures and one three-hour laboratory period a week, second semester. Prerequisite, Ent. 1 or consent of the Department. Laboratory fee, \$3.00. Haviland.

#### FOR GRADUATES

- Ent. 201. **Advanced Entomology.** Credit and prerequisites to be determined by the Department. First and second semesters. Cory and Staff.
- Ent. 202. **Research.** Cory and Staff.
- Ent. 203. **Advanced Insect Morphology (2).** One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Bickley.
- Ent. 205. **Insect Ecology (2).** One lecture and one two-hour laboratory period a week, first semester. Laboratory fee, \$3.00. Prerequisite, consent of the Department. Bickley.
- Ent. 206. **Bionomics of Mosquitoes.** One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Bickley.

#### FOREIGN LANGUAGES AND LITERATURE

Professors Zucker, Falls, Prahl, Cunz, L. P. Smith, Goodwyn, Miller (abroad as Associate Director of C.S.C.S. European program); Associate Professors Kramer, Quynn, Bingham; Assistant Professors Parsons, Schweizer, Rand,



Rosenfeld, Hammerschlag, Dobert; Adjunct Professor Juan Ramon Jimenez; Instructors Z. Jimenez, V. Smith, Nemes, de Marne, Norton, Vent, Boborykine, Bays, Becker, Richeimer, Long.

Attention is called to the courses in Comparative Literature listed on pp. 50-51.

### Master of Arts

Candidates must pass, in addition to written examinations in the courses pursued, a written examination based on the reading lists in their respective fields of French, German and Spanish, established by the Department. The examination will test the general familiarity of the candidate with his respective field and his powers of analysis and criticism. The oral examination will deal chiefly with the field of his thesis.

### Doctor of Philosophy

Candidates must pass a comprehensive written examination at least three months before the degree is awarded. This examination will include linguistics and each of the major literary fields.

### A. French

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- French 100.** French Literature of the Sixteenth Century (3). First semester. Falls.
- French 101, 102.** French Literature of the Seventeenth Century (3, 3). Three hours a week, first and second semesters. Quynn, Rosenfield.
- French 103, 104.** French Literature of the Eighteenth Century (3, 3). Three hours a week, first and second semesters. Falls, Bingham.
- French 105, 106.** French Literature of the Nineteenth Century (3, 3). Three hours a week, first and second semesters. Bingham, Quynn.
- French 107, 108.** French Literature of the Twentieth Century (3, 3). Three hours a week, first and second semesters. Falls, Bays.
- French 121, 122.** Advanced Composition (3, 3). Three hours a week, first and second semesters. Falls, Bays.
- French 161, 162.** French Civilization (3, 3). First and second semesters. Rosenfield.
- French 171.** Practical French Phonetics (3). First semester. L. P. Smith.
- French 199.** Rapid Review of the History of French Literature (1). Second semester. Especially designed for French majors. Weekly lectures. Falls.

## FOR GRADUATES

The requirements of students will determine which courses will be offered.

- French 201. Research. Credit determined by work accomplished. Staff.
- French 203, 204. Georges Duhamel, Poet, Dramatist, Novelist (2, 2). Two hours a week, first and second semesters. Falls.
- French 205, 206. French Literature of the Middle Ages (3, 3). Three hours a week, first and second semesters. L. P. Smith.
- French 207, 208. The French Novel in the First Half of the Nineteenth Century (2, 2). Two hours a week, first and second semesters. Falls.
- French 209, 210. The French Novel in the Second Half of the Nineteenth Century (2, 2). Two hours a week, first and second semesters. Falls.
- French 211. Introduction to Old French (3). Second semester. L. P. Smith.
- French 215, 216. Moliere (2, 2). First and second semesters. Quynn.
- French 221, 222. Reading Course. (Arranged.) Staff.
- French 230. Introduction to European Linguistics (3). Bays.
- French 251, 252. Seminar (3, 3). Required of all graduate majors in French. Staff.

## B. German

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- German 101, 102. German Literature of the Eighteenth Century (3, 3). Three hours a week, first and second semesters. Prael, Schweizer.
- German 103, 104. German Literature of the Nineteenth Century (3, 3). Three hours a week, first and second semesters. Prael, Cunz.
- German 105, 106. Contemporary German Literature (3, 3). Three hours a week, first and second semesters. Prael, Hammerschlag.
- German 107, 108. Goethe's Faust (2, 2). Two hours a week, first and second semesters. Zucker.
- Attention is called to Comp. Lit. 106, Romanticism in Germany, and Comp. Lit. 107, The Faust Legend in English and German Literature.
- German 121, 122. Advanced Composition (3, 3). Three hours a week, first and second semesters. Prerequisites, German 71, 80, or consent of instructor. Kramer, Cunz.
- German 161, 162. German Civilization (3, 3). Three hours a week, first and second semesters. Cunz.

- German 199. Rapid Review of the History of German Literature (1).  
Second semester. Especially designed for German majors. Weekly  
lectures. Schweizer.

## FOR GRADUATES

- The requirements of students will determine which courses will be offered.
- German 201. Research. Credits determined by work accomplished. Staff.
- German 202, 203. The Modern German Drama (3, 3). Three hours a  
week, first and second semesters. Zucker.
- German 204. Schiller (3). Prahl.
- German 205. Goethe's Works outside of Faust (2). Second semester.  
Zucker.
- German 206. The Romantic Movement (3). Prahl.
- German 208. The Philosophy of Goethe's Faust (3). First semester.  
Zucker.
- German 221, 222. Reading Course. (Arranged). First and second semes-  
ters. Staff.
- German 230. Introduction to European Linguistics (3). First semester.  
Bays.
- German 231. Middle High German (3). Second semester. Schweizer.
- German 251, 252. Seminar (3, 3). Required of all graduate majors in  
German. Staff.

## C. Spanish

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Spanish 101. Epic and Ballad (3). First semester. Goodwyn, Parsons.
- Spanish 104. The Drama of the Golden Age (3). Second semester.  
Goodwyn.
- Spanish 108. Lope de Vega (3). First semester. Parsons.
- Spanish 109. Cervantes (3). Second semester. Goodwyn, Rand.
- Spanish 110. Modern Spanish Poetry (3). First semester. Jimenez.
- Spanish 111. Modern Spanish Novel (3). Second semester. Parsons.
- Spanish 112. Modern Spanish Drama (3). First semester. Rand.
- Spanish 115. Modern Spanish Thought (3). Second semester. Rand.
- Spanish 121, 122. Advanced Composition (3, 3). First and second semes-  
ters. Bingham.
- Spanish 151. Spanish-American Novel (3). First semester. Bingham.
- Spanish 152. Spanish-American Poetry (3). Second semester. Bingham.

- Spanish 153. Spanish-American Essay (3). First semester. Bingham.
- Spanish 161, 162. Spanish Civilization (3, 3). First and second semesters. Z. Jimenez.
- Spanish 163, 164. Latin-American Civilization (3, 3). First and second semesters. Goodwyn.
- Spanish 199. Rapid Review of the History of Spanish Literature (1). Second semester. Especially designed for Spanish majors. Weekly lectures.

## FOR GRADUATES

- Spanish 201. Research. Credit determined by work accomplished. Staff.
- Spanish 202. The Golden Age in Spanish Literature (3). First semester. Goodwyn.
- Spanish 203, 204. Spanish Poetry (3, 3). Three hours a week, first and second semesters. Goodwyn.
- Spanish 207. The Spanish Mystics (3). Goodwyn.
- Spanish 211. Introduction to Old Spanish (3). Second semester. Parsons, Bays.
- Spanish 221, 222. Reading Course. (Arranged). Staff.
- Spanish 230. Introduction to European Linguistics (3). Bays.
- Spanish 251, 252. Seminar (3, 3). Required of all graduate majors in Spanish. Staff.

## D. Russian

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Russian 101, 102. Contemporary Russian Literature (3, 3). Three hours a week, first and second semesters. Boborykine.
- Russian 103, 104. Russian Literature of the Nineteenth Century (3, 3). Three hours a week, first and second semesters. Boborykine.

## GEOGRAPHY

Professors Morrison, Crist, Hu, Thom, Van Royen; Consulting Professor Joerg; Lecturers (off campus courses) Aiken, Brierly, Davies, Skop; Assistant Professors Anderson, Karinen; Research Associates Battersby, Burstow.

Students seeking graduate degrees in geography are expected to have acquired a broad foundation in the subject and in allied fields. This foundation must have included a minimum of 18 semester hours in geography, of which 3 semester hours shall have been in Physical Geography, 3 semester hours in Weather and Climate, and 6 semester hours in Human or Economic Geography. In addition the student must have taken successfully the following courses, or their equivalents, in allied fields: American Government (3 semester hours), History (6 semester hours), Introductory

or General Botany (3 semester hours), English Composition and Literature (12 semester hours), Foreign Language (12 semester hours). Students who do not have this background will be accepted as graduate students in a provisional status only and will be required to make up their deficiencies before being admitted to candidacy for an advanced degree. Graduate credit will not be given for courses taken to make up for deficiencies in background.

In addition to meeting the general requirements of the Graduate School, candidates for the Master's degree in geography are required to have taken successfully: one field course (Geography 170 or 270, or equivalent), a course in General Cartography and Graphics (Geography 154 and 155, or equivalent), a course in Soil Classification and Soil Geography, and one seminar. In addition to the final oral examination, the candidate for the Master's degree in geography is required to pass satisfactorily a written examination covering the fields in which he has worked, his understanding of basic principles, and his power of reasoning.

A graduate student seeking the Doctor of Philosophy degree in geography must take a comprehensive written and oral examination to determine whether he has a sufficiently broad and profound knowledge and understanding of the entire field of geography to qualify as a candidate for the Doctor's degree. He will be examined in the systematic aspects of the field (Climatology, Soils and Soil Geography, Geomorphology, Plant Geography, Agricultural and Industrial Geography, Urban Geography, Transport Geography, Cartography, Political Geography, and the History, Methodology and Philosophy of Geography), and in five regional fields. Normally, before taking the examination, the student should have taken one or more courses under each of the senior members of the staff, and seminars under at least two of them.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Geog. 100, 101. Regional Geography of the United States and Canada (3, 3). First and second semesters. Prerequisites, Geog. 1, 2 or Geog. 60, 61 or permission of instructor. Anderson.
- Geog. 102. The Geography of Manufacturing in the United States and Canada (3).
- Geog. 110, 111. Latin America (3, 3). First and second semesters. Crist.
- Geog. 115. The Peoples of Latin America (2). Second semester. Crist.
- Geog. 120. Economic Geography of Europe (3). First semester. Van Royen.
- Geog. 122. Economic Resources and Development of Africa (3.). Second semester. Van Royen.
- Geog. 123. Problems of Colonial Geography (3). First or second semester. Van Royen.

- Geog. 130, 131. **Economic and Political Geography of Southern and Eastern Asia (3, 3).** First and second semesters. Not offered 1951-1952. Hu.
- Geog. 134, 135. **Cultural Geography of East Asia (3, 3).** First and second semester.
- Geog. 140. **Soviet Lands I (3).** First semester. Morrison.
- Geog. 141. **Soviet Lands II (3).** Second semester. Prerequisite, Geog. 140. Morrison.
- Geog. 146. **The Near East (3).** First semester. Morrison.
- Geog. 150. **Problems of Map Evaluation I. Typographic Maps (3).** Off campus. First or second semester. Two hours lecture and two hours laboratory a week. Prerequisite, Geog. 30. Davies, Geological Survey.
- Geog. 151. **Problems of Map Evaluation II. Non-Topographic Special-Use Maps (3).** Off campus. First or second semester. Two-hour lecture and two hours laboratory a week. Prerequisite, Geog. 150. Brierly, Army Map Service.
- Geog. 152. **Problems and Practices of Photo Interpretation (3).** Off campus. First and second semesters. Two-hour lecture and two hours laboratory a week. Prerequisite, Geog. 31 or equivalent.
- Geog. 154, 155. **General Cartography and Graphics (3, 3).** First and second semesters. One lecture and two two-hour laboratory periods a week. Prerequisite, Geog. 30 or consent of instructor. Karinen.
- Geog. 160. **Elementary Toponymy (3).** Off campus. First and second semesters. Prerequisite, Geog. 30 and one foreign language. Aiken, Army Map Service.
- Geog. 162. **Intermediate Climatology (3).** Second semester. Prerequisite, Geog. 41 or consent of instructor. Thom.
- Geog. 170. **Local Field Course (3).** First semester. Karinen.
- Geog. 171. **Summer Field Course (6).** Summer School. Western Maryland. Brierly.
- Geog. 180, 181. **History, Nature and Methodology of Geography (3, 3).** First and second semesters. Not offered in 1951-1952. Hu.
- Geog. 190. **Political Geography (3).** Second semester. Morrison.

## FOR GRADUATES

- Geog. 210, 211. **Seminar in the Geography of Latin America (3, 3).** First and second semesters. Prerequisites, Geog. 110, 111 or consent of instructor. Crist.
- Geog. 220, 221. **Seminar in the Geography of Europe and Africa (3, 3).** First and second semesters. Prerequisites, Geog. 120, 121 or consent of instructor. Van Royen.

- Geog. 230, 231. Seminar in Geography of China (3, 3). First and second semesters. Hu.
- Geog. 240, 241. Seminar in the Geography of the U.S.S.R. (3, 3). First and second semesters. Prerequisites, reading knowledge of Russian and Geog. 140, 141 or consent of instructor. Morrison.
- Geog. 246. Seminar in the Geography of the Near East (3). Not given in 1951-1952. Morrison.
- Geog. 250. Seminar in Cartography. (Credit to be arranged.) First or second semester. Karinen, Davies.
- Geog. 260. Micro-Climatology (3). Second semester. Prerequisite, Geog. 162 or consent of instructor. Thom.
- Geog. 261. Advanced General Climatology (3). First semester. Prerequisite, Geog. 162 or consent of instructor. Thom.
- Geog. 262, 263. Seminar in Meteorology and Climatology. (3, 3). First and second semesters. Prerequisite, consent of instructor. Thom.
- Geog. 280. Geomorphology (3). Second semester. Van Royen.
- Geog. 290, 291. Visitors' Seminar. (Credit to be arranged.) First and second semesters. Visitors and Staff.
- Geog. 292, 293. Individual Research. (Credit to be arranged.) First and second semesters and summer.

## GOVERNMENT AND POLITICS

Professors Burdette, Larsen, Ray, Starr, Steinmeyer; Associate Professor Pilschke; Assistant Professors Anderson, Dixon, Lambert; Instructors Gass, Henderson, Hester, Mester, Moser, Spurgeon, Whitney.

For the Master's degree, a comprehensive written examination is given on graduate course work in the major field. At the discretion of the Department, an oral examination may be substituted for the written examination.

The doctoral candidate must show in written examinations satisfactory competence in five of the following fields: (1) Comparative Government; (2) International Political Affairs; (3) Local Government; (4) Political Theory; (5) Public Administration; (6) Public Law; (7) Public Policy. No candidate may attempt the comprehensive examinations prior to completion of the language requirements for the doctorate, and no candidate may attempt the comprehensive examinations more than twice.

## Government and Politics

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- G. & P. 101. International Political Relations (3). First semester. Prerequisite, G. & P. 1. Starr, Plischke.

- G. & P. 102. International Law (3). Second semester. Prerequisite, G. & P. 1. Starr, Plischke.
- G. & P. 105. Recent Far Eastern Politics (3). First semester. Prerequisite, G. & P. 1. Steinmeyer.
- G. & P. 106. American Foreign Relations (3). Second semester. Prerequisite, G. & P. 1. Plischke.
- G. & P. 110. Principles of Public Administration (3). First semester. Prerequisite, G. & P. 1. Larsen, Ray.
- G. & P. 111. Public Personnel Administration (3). First semester. Prerequisite, G. & P. 1. Larsen.
- G. & P. 112. Public Financial Administration (3). Second semester. Prerequisite, G. & P. 1. Larsen.
- G. & P. 124. Legislatures and Legislation (3). Second semester. Prerequisite, G. & P. 1. Starr, Burdette.
- G. & P. 131, 132. Constitutional Law (3, 3). First and second semesters. Prerequisite, G. & P. 1. Dixon.
- G. & P. 133. Administration of Justice (3). Second semester. Prerequisite, G. & P. 1. Dixon.
- G. & P. 141. History of Political Theory (3). First semester. Prerequisite, G. & P. 1. Anderson, Dixon.
- G. & P. 142. Recent Political Theory (3). Second semester. Prerequisite, G. & P. 1. Anderson, Dixon.
- G. & P. 144. American Political Theory (3). Second semester. Prerequisite, G. & P. 1. Anderson.
- G. & P. 154. Problems of World Politics (3). Second semester. Prerequisite, G. & P. 1. Steinmeyer.
- G. & P. 174. Political Parties (3). First semester. Prerequisite, G. & P. 1. Burdette.
- G. & P. 178. Public Opinion (3). First semester. Prerequisite, G. & P. 1. Burdette.
- G. & P. 181. Administrative Law (3). Second semester. Prerequisite, G. & P. 1. Ray, Dixon.

## FOR GRADUATES

- G. & P. 201. Seminar in International Political Organization (3). Plischke.
- G. & P. 202. Seminar in International Law (3). Plischke.
- G. & P. 205. Seminar in American Political Institutions (3). Burdette.
- G. & P. 207. Seminar in Comparative Governmental Institutions (3). Starr, Steinmeyer.



- G. & P. 211. Seminar in Federal-State Relations (3). Ray.
- G. & P. 213. Problems of Public Administration (3). Ray.
- G. & P. 214. Problems of Public Personnel Administration (3). Larsen.
- G. & P. 215. Problems of State and Local Government in Maryland. Larsen.
- G. & P. 216. Government Administrative Planning and Management (3). Larsen.
- G. & P. 217. Government Corporations and Special Purpose Authorities (3). Ray.
- G. & P. 221. Seminar in Public Opinion (3). Burdette.
- G. & P. 223. Seminar in Legislatures and Legislation (3). Burdette.
- G. & P. 224. Seminar in Political Parties and Politics (3). Burdette.
- G. & P. 225. Man and the State (3). Staff.
- G. & P. 231. Seminar in Public Law (3). Ray, Dixon.
- G. & P. 251. Bibliography of Government and Politics (3). Burdette.
- G. & P. 261. Research in Government and Politics (3). Staff.
- G. & P. 281. Departmental Seminar (No Credit). Registration for two semesters required of all doctoral candidates. Staff.
- G. & P. 299. Thesis Course (Arranged).

## HISTORY

Professors Gewehr, Chatelain, Prange, Wellborn; Associate Professors Bauer, Merrill; Assistant Professors Crosman, Gordon, Jashemski; Instructors Bates, Ferguson, Johnson, Lowitt, Sellers, Sparks.

### Master of Arts

1. Eight to ten hours of the total major course requirements of all candidates for this degree must be acquired in general field of the thesis, i.e., either American or European history.

2. H. 287, Historiography, is required of all candidates for graduate degrees in history.

3. Candidates for the Master of Arts degree must pass a two-hour qualifying written examination no later than one month before the date set for the final oral examination. The purpose of the written examination is to determine the student's general grasp of the larger field in which the thesis lies, (e.g. American, European, English, Latin-American). The examination will include not only factual and interpretative material, but also bibliography and historiography. However, it will not be based on courses as such.

4. The final oral examination will be confined to the general field of the thesis, and the thesis itself. It is understood that the representative of the minor field may examine the candidate on the minor subject or subjects at his discretion.

### Doctor of Philosophy

1. At least thirty hours of the total major course requirements, including H. 287, must be acquired in the general field of the thesis, i.e., American history or European history.

2. At least ten hours of the thirty required for a minor in history must be taken at the University of Maryland.

3. Recommendations for admission to candidacy will be determined by the department on the basis of achievement which the student may be required to substantiate by oral or written examinations.

4. Before confirmation for the degree the student must pass a written comprehensive examination in addition to the final oral examination required by the Graduate School.

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

#### A. American History

H. 5, 6 are prerequisites for courses H. 101 to H. 142, inclusive.

H. 101. American Colonial History (3). First semester. Ferguson.

H. 102. The American Revolution (3). Second semester. Ferguson.

H. 105. Social and Economic History of the United States to 1865 (3, 3).  
First and second semesters. Chatelain.

H. 106. Social and Economic History of the United States Since the Civil War (3). Second semester. Chatelain.

H. 114. The Middle Period of American History 1824-1860 (3). First semester. Sparks.

H. 115. The Old South (3). First semester. Sellers.

H. 116. The Civil War (3). Second semester. Sparks.

H. 117. The New South (3). First semester. Bates.

H. 121, 122. History of the American Frontier (3, 3). First and second semesters. Gewehr.

H. 123. The New West (3). Second semester. Bates.

H. 124. Reconstruction and the New Nation 1865-1896 (3). Second semester. Merrill.

H. 127, 128. Diplomatic History of the United States (3, 3). First and second semesters. Wellborn.

H. 129. The United States and World Affairs (3). First semester. Wellborn.

- H. 133, 134. The History of American Ideas (3, 3). First and second semesters. Johnson.
- H. 135, 136. Constitutional History of the United States (3, 3). First and second semesters. Gewehr.
- H. 141, 142. History of Maryland (3, 3). Three hours a week, first and second semesters. Chatelain.
- H. 145, 146. Latin-American History (3, 3). Three hours a week, first and second semesters. Crosman.
- H. 147. History of Mexico (3). First semester. Crosman.

### B. European History

- H. 1, 2 or H. 3, 4 are prerequisites for courses H. 151 to H. 191, inclusive.
- H. 151. History of the Ancient Orient and Greece (3). First semester. Jashemski.
- H. 152. History of Rome (3). Second semester. Jashemski.
- H. 155. Medieval Civilization (3). First semester. Jashemski.
- H. 161. The Renaissance and Reformation (3). Second semester. Jashemski.
- H. 166. Revolutionary and Napoleonic Europe (3). Second semester. Bauer.
- H. 171, 172. Europe in the Nineteenth Century, 1815-1919 (3, 3). First and second semesters. Bauer.
- H. 175, 176. Europe in the World Setting of the Twentieth Century (3, 3). First and second semesters. Prange.
- H. 185, 186. History of the British Empire (3, 3). First and second semesters. Gordon.
- H. 187. History of Canada (3). First semester. Gordon.
- H. 189. Constitutional History of Great Britain (3). Second semester. Gordon.
- H. 191. History of Russia (3). First semester. Bauer.
- H. 192. Foreign Policy of the USSR (3). Second semester. Prerequisites, H. 1, 2 and H. 191. Bauer.
- H. 195. The Far East (3). Second semester. Gewehr.
- H. 199. Proseminar in Historical Writing (3). First and second semesters. Stromberg.

### FOR GRADUATES

- H. 200. Research (3-6). Credit apportioned to amount of research. First and second semesters. Staff.

- H. 201. Seminar in American History (3). First and second semesters.  
Staff.
- H. 205, 206. Topics in American Economic and Social History (3, 3).  
First and second semesters. Chatelain.
- H. 208. Topics in Recent American History (3). First and second semesters.  
Merrill.
- H. 211. The Colonial Period in American History (3). First semester.  
Ferguson.
- H. 212. Period of the American Revolution (3). Second semester.  
Ferguson.
- H. 215. The Old South (3). First semester. Sellers.
- H. 216. The American Civil War (3). First semester. Merrill.
- H. 217. Reconstruction and its Aftermath (3). Second semester. Merrill.
- H. 221, 222. History of the West (3, 3). Gewehr.
- H. 245. Topics in Latin-American History (3). Crosman.
- H. 250. Seminar in European History (3). First and second semesters.  
Bauer.
- H. 251. Topics in Greek Civilization (3). Jashemski.
- H. 253. Topics in Roman History (3). Jashemski.
- H. 255. Medieval Culture and Society (3). (Arranged). Jashemski.
- H. 282. Problems in the History of World War II (3). Prange.
- H. 285, 286. Topics in the History of Modern England and Great Britain  
(3, 3). First and second semesters. Gordon.
- H. 287. Historiography (3). First and second semesters. Required of all  
candidates for advanced degrees in history. Sparks.

## HOME ECONOMICS

### A. Textiles and Clothing

Professor Mitchell; Associate Professor Akin; Assistant Professors Middleton, Wilbur; Instructors Friemel, Houston.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Tex. 101. Problems in Textiles (3). One lecture and three laboratory periods a week, first semester. Laboratory fee, \$3.00. Prerequisites, Tex. 100; Organic Chemistry. Middleton.
- Tex. 102. Textile Testing (3). Three laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisite, Tex. 100. Middleton.
- Tex. 103. Textile Microscopy (3). Three laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisite, Tex. 101, or equivalent. Middleton.

- Tex. 105. Consumer Problems in Textiles (3).** Two lectures and one laboratory period a week, second semester. Laboratory fee, \$3.00. Prerequisite, Tex. 1, or equivalent. Friemel.
- Tex. 106. Household Textiles (3).** Three laboratory periods a week, first semester. Laboratory fee, \$3.00. Prerequisite, Tex. 1, or equivalent. Friemel.
- Tex. 108. Decorative Fabrics (2).** One lecture and one laboratory period a week, second semester. Laboratory fee, \$3.00. Prerequisite, Tex. 1. Middleton, Wilbur.
- Clo. 120. Draping (3).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Houston, Wilbur.
- Clo. 121. Pattern Designs (2).** Two laboratory periods a week, second semester, summer session. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Wilbur.
- Clo. 122, 125. Tailoring (2, 2).** Two laboratory periods a week, first and second semesters, summer session. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Mitchell.
- Clo. 123. Children's Clothing (2).** One lecture and one laboratory period a week, first and second semesters. Laboratory fee, \$3.00. Prerequisite, Clo. 20A. or 20B, or equivalent. Houston, Wilbur.
- Clo. 124. Projects and Readings in Textiles and Clothing (2).** Second semester. Laboratory fee, \$3.00. Mitchell.
- Clo. 126. Fundamentals of Fashion (2-3).** First semester. Laboratory fee, \$3.00. Wilbur.
- Clo. 127. Apparel Design (3).** First and second semesters. Laboratory fee, \$3.00. Prerequisite, Clo. 120. Houston, Wilbur.
- Clo. 128. Home Furnishings (3).** Three laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisites, Tex. 1, Clo. 20A or B, or consent of instructor. Wilbur.

## FOR GRADUATES

- Tex. 200. Special Studies in Textiles (2-4).** Laboratory fee, \$3.00.
- Clo. 220. Special Studies in Clothing (2-4).** First and second semesters. Laboratory fee, \$3.00. Mitchell, Wilbur.
- Tex. and Clo. 230. Seminar (1).** First and second semesters. Laboratory fee, \$3.00. Mitchell.
- Tex. and Clo. 231. Research (2-6).** First and second semesters. Laboratory fee, \$3.00. Staff.
- Tex. and Clo. 232. Economics of Textiles and Clothing (3).** Second semester. Laboratory fee, \$3.00. Mitchell.

**B. Practical Art and Crafts**

Professor Curtiss; Assistant Professors Cuneo, Lawson, B. Mahoney;  
Instructors Brown, Davis, A. Mahoney.

**FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- Pr. Art 100, 101. Mural Design (2, 2).** Two laboratory periods a week, first semester. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 2, 3, 21, and consent of the instructor. Cuneo.
- Pr. Art 102, 103. Advanced Mural Design (2, 2).** Two laboratory periods a week, first semester. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 2, 3, 21, 100, 101. Cuneo.
- Pr. Art 120, 121. Costume Illustration (2, 2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 21, 22, and consent of instructor.
- Pr. Art 124, 125. Individual Problems in Costume (2, 2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 120, 121, and consent of instructor.
- Pr. Art 132. Advertising Layout (2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 21, 22, 30, and consent of instructor. Cuneo.
- Pr. Art 134, 135. Individual Problems in Advertising (2, 2).** Two laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, or equivalent, and consent of instructor. Cuneo.
- Pr. Art 136. Merchandise Display (2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, to precede or parallel.
- Pr. Art 137. Advanced Merchandise Display (2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, 136, and consent of instructor.
- Pr. Art 138, 139. Advanced Photography (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 38, 39. Davis.
- Pr. Art 140, 141. Interior Design (1, 3).** One laboratory period a week, first semester; three laboratory periods a week, second semester. Prerequisites, Pr. Art 1 and Pr. Art 2. Laboratory fee, \$3.00 for 141. Brown.
- Pr. Art 142, 143. Advanced Interior Design (2, 2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 140, 141, or equivalent. Brown.

- Pr. Art 144, 145. Individual Problems in Interior Design (2, 2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 140, 141, 142, 143, and consent of instructor. Brown.
- Cr. 120, 121. Advanced Ceramics (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 20, 21. Mahoney.
- Cr. 124, 125. Individual Problems in Ceramics (2, 2).** Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 20, 21, 120, 121, and consent of instructor. Mahoney.
- Cr. 130, 131. Advanced Metalry (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 30, 31. Lawson.
- Cr. 134, 135. Individual Problems in Metalry (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 30, 31, 130, 131, and consent of instructor. Lawson.
- Cr. 140, 141. Advanced Weaving (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 40, 41. Lawson.
- Cr. 144, 145. Individual Problems in Weaving (2, 2).** Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 40, 41, 140, 141, and consent of instructor. Lawson.
- Cr. 198. Crafts in Therapy (2).** Second semester. Prerequisites, three courses in various crafts or art construction and consent of instructor. Mahoney.

### C. Home and Institution Management

Professor Mount; Associate Professor Braucher; Assistant Professor Crow;  
Instructor Love.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Home Mgt. 150, 151. Management of Home (3, 3).** Three hours a week, first and second semesters. Crow, Love.
- Home Mgt. 152. Experience in Management of Home (3).** First and second semesters. Prerequisites, Home Mgt. 150, 151. Laboratory fee, \$7.00. Crow, Love.
- Inst. Mgt. 160. Institution Organization and Management (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, Foods 2, 3; Nut. 110; Home Mgt. 150, 151 to precede or parallel. Braucher.
- Inst. Mgt. 161. Institution Purchasing and Accounting (3).** Two lectures and one laboratory period a week, first semester. Braucher.

- Inst. Mgt. 162. Institution Foods (3). One lecture and two laboratory periods a week, second semester. Prerequisites, Inst. Mgt. 160, 161.
- Inst. Mgt. 163. Practice in Institution Management (3). Arranged. Three laboratory periods a week. Prerequisites, Inst. Mgt. 160, 161.
- Inst. Mgt. 164. Advanced Institution Management (2). One lecture and one laboratory period a week, second semester. Prerequisites, Inst. Mgt. 160, 161, 162. Braucher.
- Inst. Mgt. 165. School Lunch (3). Two lectures and one laboratory period a week, second semester and summer session. Prerequisites, Foods 2, 3; Nut. 110, or equivalent.
- Inst. Mgt. 181. Purchasing and Accounting for Housekeeping Administration (3). Second semester. Prerequisite, Inst. Mgt. 160.
- Inst. Mgt. 182. Housekeeping Management (3). First semester. Prerequisite, Inst. Mgt. 160.
- Inst. Mgt. 183. Problems in Housekeeping Management (3). Second semester. Prerequisites, Inst. Mgt. 160 and Inst. Mgt. 182.

#### D. Foods and Nutrition

Associate Professor Braucher; Assistant Professors Cornell, Peers;  
Instructors Duke, McDuffee.

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Foods 100. Food Economics (2). One lecture and one laboratory period a week, first semester. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3.
- Foods 101. Meal Service (2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3. Cornell, Duke.
- Foods 102. Experimental Foods (3). One lecture and two laboratory periods a week, first semester. Laboratory fee, \$7.00. Prerequisites, Foods 2, 3; Organic Chemistry, Chem. 31, 32, 33, 34. Peers.
- Foods 103. Demonstrations (2). Two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisites, Clo. 20; Foods 1 or 2, 3; Pr. Art 20; Tex. 1. Peers.
- Foods 104. Advanced Foods (2). Two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3. Peers.
- Foods 105. Foods of Other Countries (3). One lecture and two laboratory period a week, first semester. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3, or equivalent. Peers.
- Nut. 110. Nutrition (3). First semester. Prerequisites, Foods 2, 3; Organic Chemistry, Chem. 31, 32, 33, 34. Laboratory fee, \$7.00. Braucher.



**Nut. 111. Child Nutrition (2).** One lecture and one laboratory period a week, second semester. Laboratory fee, \$7.00. Prerequisites, Foods 1 or 2, 3; Nut. 110 or 10. McDuffee.

**Nut. 112. Dietetics (3).** One lecture and two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisite, Nut. 110. Braucher.

**Nut. 113. Dietetics (2).** Two periods a week, second semester. Prerequisite, Nut. 110.

#### FOR GRADUATES

**Foods 200. Advanced Experimental Foods (3-5).** Laboratory fee, \$7.00. Second semester.

**Nut. 210. Readings in Nutrition (3).** First semester.

**Nut. 211. Problems in Nutrition (3-5).** Second semester.

**Nut. 212. Nutrition for Community Service (3).** First semester.

**Foods and Nut. 204. Recent Advances in Foods and Nutrition (2-3).** Second semester.

**Foods and Nut. 220. Seminar (1).** First and second semesters.

**Foods and Nut. 221. Research.** First and second semesters. Laboratory fee, \$7.00.

#### E. Home Economics Extension

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**H. E. Ext. 100. Methods in Home Economics Extension (3).** Second semester.

#### HORTICULTURE

Professors Haut, Kramer, Link, Scott, Walls; Associate Professors Caldwell, Cornell, Shanks, Shoemaker, Stark; Instructor Hawes.

This Department offers graduate work in the fields of Floriculture and Ornamental Horticulture, Horticultural Processing, Olericulture, and Pomology leading to the Master of Science or Doctor of Philosophy degrees.

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Hort. 101, 102. Technology of Fruits (2, 2).** Two hours a week, first and second semesters. Prerequisite, Bot. 101. Haut.

**Hort. 103, 104. Technology of Vegetables (2, 2).** Two hours a week, first and second semesters. Prerequisite, Bot. 101. Stark.

**Hort. 105. Technology of Ornamentals (2).** Two hours a week, first or second semester. Prerequisite, Bot. 101. Link.

**Hort. 106. World Fruits and Nuts (2).** Second semester. Haut.

**Hort. 107, 108. Plant Materials (3, 3).** Two lectures and one laboratory period a week, first and second semesters. Prerequisite, Bot. 1. Cornell.

- Hort. 114. Systematic Pomology (3).** Two lectures and one laboratory period a week, first semester. Given in alternate years. Haut.
- Hort. 116. Systematic Olericulture (3).** Two lectures and one laboratory period a week, first semester. Given in alternate years. Walls.
- Hort. 122. Special Problems (2, 2).** First and second semesters. Credit arranged according to work done. For major students in horticulture or botany. Staff.
- Hort. 123. Grading and Judging of Canned and Frozen Products (2).** First semester. One lecture and one laboratory period a week. Prerequisites, Hort. 58, 155, 156. Caldwell.
- Hort. 124. Quality Control (3).** Second semester. Two lectures and one laboratory period a week. Prerequisite, Hort. 123. Caldwell.
- Hort. 126. Nutritional Analyses of Processed Crops (3).** Second semester. One lecture and two laboratory periods a week. Prerequisites, Chem. 33 and 34, Bot. 101, Hort. 123. Caldwell.
- Hort. 150, 151. Commercial Floriculture (3, 3).** First and second semesters. Two lectures and one laboratory period a week. Prerequisites, Bot. 1, Hort. 11. Link.
- Hort. 155. Commercial Processing I (3).** First semester. Two lectures and one laboratory period a week. Laboratory fee, \$5.00. Prerequisites, Chem. 32, 34, Hort. 61. Walls.
- Hort. 156. Commercial Processing II (2).** One lecture and one laboratory period a week. Prerequisite, Hort. 155. Walls.
- Hort. 159. Nursery Management (3).** Second semester. Two lectures and one laboratory period a week. Prerequisites, or concurrently, Hort. 62, 107, 108. Cornell.

#### FOR GRADUATES

- Hort. 201, 202. Experimental Pomology (3, 3).** Three hours a week, first and second semesters. Prerequisite, Bot. 101.
- Hort. 203, 204. Experimental Olericulture (2, 2).** Two hours a week, first and second semesters. Prerequisite, Bot. 101. Stark.
- Hort. 205. Experimental Pomology (3).** Second semester. This course is a continuation of Hort. 201, 202. Scott, Haut.
- Hort. 206. Horticulture Cyto-Genetics (3).** Second semester. Prerequisites, Zool. 104, Bot. 101, Bot. 201, or equivalents. ———.
- Hort. 207. Methods of Horticultural Research (3).** Second semester. One lecture and one four-hour laboratory period a week. Scott.
- Hort. 208. Advanced Horticultural Research (2 to 12).** First and second semesters. Credit granted according to work done. Staff.

**Hort. 209. Advanced Seminar (1).** First and second semesters. Five credit hours for five semesters can be obtained. Haut and Staff.

### MATHEMATICS

Professors Martin, Hall, Jackson; Associate Professors Vanderslice, Truesdell; Assistant Professors Brigham, Good, Leutert, Sharp; Lecturer Polachek; Instructors Boyer, Brewster, Eakens, Eisenman, Facey, Gorciu, Greenspan, Jarnagin, McLean, Meals, Menneken, Shepher, Thorpe.

The Colloquium meets weekly for reports on the research of the faculty and graduate students, and for expository lectures on papers published in current mathematical journals.

A student who intends to present a minor in mathematics of nine credit hours for the degree of Doctor of Philosophy must include at least three credit hours of 200 courses. If the program includes 12 credit hours or more, at least six credit hours must be in 200 courses.

#### A. Algebra

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Math. 100, 101. Higher Algebra (3, 3).** (Not offered 1951-1952.) Pre-requisite, Math. 21 or equivalent. Brigham.

**Math. 102. Theory of Equations (3).** First semester. Prerequisite, Math. 21 or equivalent. Good.

**Math. 103. Introduction to Modern Algebra (3).** Second semester. Pre-requisite, Math. 21 or equivalent. Sharp.

**Math. 106. Introduction to the Theory of Numbers (3).** Second semester. Prerequisite, Math. 21 or equivalent. Brigham.

##### FOR GRADUATES

**Math. 200, 201. Modern Algebra (3, 3).** (Not offered 1951-1952.). Pre-requisite, Math. 103 or consent of instructor. Good.

**Math. 202. Matrix Theory (3).** Second semester. Prerequisite, Math. 103 or consent of instructor. Sharp.

**Math. 204, 205. Topological Groups (3, 3).** Prerequisite, consent of instructor. Hall, Good.

**Math. 271. Selected Topics in Algebra (3).** Arranged.

#### B. Analysis

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Math. 110, 111. Advanced Calculus (3, 3).** First and second semesters. Prerequisite, Math. 21 or equivalent. Brigham.

- Math. 114, 115.** Differential Equations (3, 3). (Math 114, second semester; Math. 115, not offered 1951-1952.) Prerequisite, Math. 21 or equivalent. Martin.
- Math. 116, 118.** Introduction to Complex Variable Theory (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 21 or equivalent. Open to students in engineering and the physical sciences. Graduate students in mathematics should enroll in Math. 210, 211. Truesdell.
- Math. 117.** Fourier Series (3). (Not offered 1951-1952.) Prerequisite, Math. 114 or equivalent. Sharp.
- Math. 119, 120.** Intermediate Differential Equations (3, 3). (Not offered 1951-1952.) Prerequisites, Math. 114, for Math. 119; Math. 115, for Math. 120. Truesdell.

#### FOR GRADUATES

- Math. 210, 211.** Functions of a Complex Variable (3, 3). Prerequisite, Math. 111 or equivalent. Vanderslice.
- Math. 213, 214.** Functions of a Real Variable (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 111 or equivalent. Jackson.
- Math. 215, 216.** Advanced Differential Equations (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 111 and 116, or 210. Martin.
- Math. 217, 218.** Analytic Number Theory (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 106 and 211. Brigham.
- Math. 272.** Selected Topics in Analysis (3). Arranged.

### C. Geometry and Topology

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Math. 122, 123.** Elementary Topology (3, 3). Prerequisite, Math. 21 or equivalent. Hall.
- Math. 124, 125.** Introduction to Projective Geometry (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 21 or equivalent. Jackson.
- Math. 126, 127.** Introduction to Differential Geometry and Tensor Analysis (3, 3). (Not offered 1950-1951.) Prerequisite, Math. 21 or equivalent. Vanderslice.
- Math. 128, 129.** Higher Geometry (3, 3). Prerequisite, Math. 21 or consent of instructor. Math. 128 is not a prerequisite for Math. 129. Open to students in the College of Education. Jackson.

#### FOR GRADUATES

- Math. 220, 221.** Differential Geometry (3, 3). (Not offered 1951-1952.) Prerequisite, Math. 111 and 134, or consent of instructor. Jackson.
- Math. 222.** Foundations of Geometry (3). (Not offered 1951-1952.) Prerequisite, Math. 124 or consent of instructor. Jackson.

- Math. 223, 224.** Combinatorial Topology (3, 3). (Not offered 1951-1952.)  
Prerequisite, Math. 103 and 111, or equivalent. Hall.
- Math. 225, 226.** Set-theoretic Topology (3, 3). (Not offered 1951-1952.)  
Prerequisite, Math. 111 or equivalent. Hall.
- Math. 227.** Tensor Analysis (3). Second semester. Prerequisite, Math.  
111 and 134, or equivalent. Vanderslice.
- Math. 273.** Selected Topics in Geometry and Topology (3). Arranged.

#### D. Applied Mathematics

##### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Math. 130, 131.** Analytic Mechanics (3, 3). Prerequisite, Math. 21 or  
equivalent. Leutert.
- Math. 132, 133.** Advanced Mathematics for Engineers and Physicists (3, 3).  
Prerequisite, Math. 21 or equivalent. Vanderslice.
- Math. 134.** Vector Analysis (3). First semester. Prerequisite, Math. 21  
or equivalent. Martin.
- Math. 135.** Numerical Analysis (3). (Not offered 1951-1952.) Prerequi-  
site, Math. 114 or equivalent. Polachek.

##### FOR GRADUATES

- Math. 230, 231.** Applied Mathematics (3, 3). (Not offered 1951-1952.)  
Prerequisite, Math. 111 and 114, or equivalent. Martin.
- Math. 232, 233.** Partial Differential Equations of Mathematical Physics  
(3, 3). (Not offered 1951-1952.) Prerequisite, Math. 111 and 114, or  
equivalent. Leutert.
- Math. 234.** Potential Theory (3). (Not offered 1951-1952.) Prerequisite,  
Math. 111 or equivalent. Leutert.
- Math. 235.** Advanced Numerical Analysis (3). (Not offered 1951-1952.)  
Prerequisite, Math. 114 and 135, or equivalent. Polachek.
- Math. 236.** Mathematical Theory of Hydrodynamics (3). (Not offered  
1951-1952.) Prerequisite, Math. 116 or equivalent. Synge.
- Math. 237.** Mathematical Theory of Elasticity (3). (Not offered 1951-  
1952.) Prerequisite, Math. 111 or equivalent. Leutert.
- Math. 238.** Mathematical Theory of Continuous Media (3). Not offered  
1951-1952.) Prerequisite, Math. 134 or consent of instructor.  
Truesdell.
- Math. 239.** Mathematical Theory of Electricity and Magnetism (3). First  
semester. Prerequisite, Math. 134 or consent of instructor. Sharp.
- Math. 240.** Advanced Numerical Analysis (3). (Not offered 1951-1952.)  
Prerequisite, Math. 235 or equivalent. Clippinger.
- Math. 274.** Selected Topics in Applied Mathematics (3). Arranged.

**E. Research****FOR GRADUATES**

**Math. 298. Proseminar in Research (2).** Second semester. Prerequisite, one semester of graduate work in mathematics. Staff.

**Math. 300. Research.** Arranged.

**MECHANICAL ENGINEERING**

Professors Younger, Shreeve, Jackson; Associate Professors Hayleck, Hoshall, Long, Martin; Assistant Professors Allen, Eyler, Hennick, Read, Ojalvo, Warner; Instructors Baker, Coffman, Guard, Mattingly, Shames, Thomas.

Instruction and research facilities are available for the degrees of Master of Science and Doctor of Philosophy in Mechanical Engineering.

**MASTER OF SCIENCE**

Registration in six credits of research (M. E. 221, Research) for the thesis is required.

**DOCTOR OF PHILOSOPHY**

One of the minors must be Mathematics, in which 12 credits in graduate (200) courses are required.

**FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**M. E. 100. Thermodynamics (3).** First semester. Two lectures and one laboratory period a week. Prerequisites, Phys. 21, Math. 21. Laboratory fee, \$3.00.

**M. E. 101. Heat Transfer (2).** First semester. Two lectures a week. Prerequisites, M. E. 54 and M. E. 100.

**M. E. 102. Heating and Air Conditioning (3).** First semester. Two lectures and one laboratory period a week. Prerequisites, M. E. 100, M. E. 54; M. E. 101 concurrently.

**M. E. 103. Refrigeration (3).** Second semester. Two lectures and one laboratory period a week. Prerequisites, M. E. 100, M. E. 101, M. E. 102. Laboratory fee, \$3.00.

**M. E. 104, 105. Prime Movers (4, 4).** First and second semesters. Three lectures and one laboratory period a week. Prerequisites, Mech. 52, M. E. 54, M. E. 100.

**M. E. 106, 107. Mechanical Engineering Design (4, 4).** First and second semesters. Two lectures and two laboratory periods a week. Prerequisites, Mech. 52, M. E. 53.

**M. E. 108, 109. Mechanical Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Laboratory fee, \$3.00.

## FOR GRADUATES

- M. E. 200, 201. **Advanced Dynamics (3, 3).** First and second semesters. Prerequisites, Mech. 52, Math. 64, M. E. 107; M. E. 109. Younger.
- M. E. 202, 203. **Applied Elasticity (3, 3).** First and second semesters. Prerequisites, Mech. 52, Math. 54, M. E. 107. Younger.
- M. E. 204, 205. **Advanced Thermodynamics and Heat Transfer. (3, 3).** First and second semesters. Three lectures a week. Prerequisites, M. E. 101, M. E. 104, M. E. 105, Math. 64.
- M. E. 206, 207. **Advanced Machine Design (3, 3).** First and second semesters. Two lectures and one laboratory period a week. Prerequisite, Math. 64, M. E. 107. Jackson.
- M. E. 208, 209. **Steam Power Plant Design (3, 3).** First and second semesters. One lecture and two laboratory periods a week. Prerequisite, M. E. 105. Shreeve.
- M. E. 210, 211. **Advanced Fluid Mechanics (3, 3).** First and second semesters. Prerequisites, M. E. 54, Math. 64.
- M. E. 212, 213. **Advanced Steam Power Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M. E. 204, 205. Shreeve.
- M. E. 214, 215. **Advanced Applied Mechanics Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisites, registration in M. E. 200, 201 and M. E. 202, 203. Shames.
- M. E. 216, 217. **Advanced Internal Combustion Engine Design (3, 3).** First and second semesters. One lecture and two laboratory periods a week. Prerequisites, M. E. 104, 105; M. E. 106, 107 and registration in M. E. 200, 201 and M. E. 204, 205. Shreeve.
- M. E. 218, 219. **Advanced Internal Combustion Engine Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M. E. 216, 217. Shreeve.
- M. E. 220. **Seminar.** Credit in accordance with work outlined by mechanical engineering staff. Staff.
- M. E. 221. **Research.** Credit in accordance with work outlined by mechanical engineering staff. Staff.
- Research in any field of mechanical engineering as applied mechanics, heat transfer, thermodynamics, heat, power, etc.
- M. E. 222. **Advanced Metallography (3).** First semester. Two lectures and one laboratory period a week. Prerequisite, M. E. 53, Mech. 52. Jackson.

- M. E. 223, 224. Steam and Gas Turbine Design (3, 3). First and second semesters. Three lectures a week. Prerequisites, M. E. 101, M. E. 104, M. E. 105, Math. 64. Shreeve.
- M. E. 225, 226. Advanced Properties of Metals and Alloys. (2, 2). First and second semesters. Two lectures a week. Prerequisite, Mech. 52, M. E. 53, M. E. 106, M. E. 107. Jackson.
- M. E. 227, 228. Theory of Elasticity (3, 3). First and second semesters. Three lectures a week. Prerequisites, Mech. 52, M. E. 53, M. E. 106, M. E. 107, Math. 64. Younger.
- M. E. 229, 230. Jet Propulsion (3, 3). Prerequisites, M. E. 101, M. E. 104, M. E. 105. Shreeve.

### PHILOSOPHY

Professor Baylis; Assistant Professor Dewey; Instructor Robinson.

This Department is now offering the Master of Arts degree and providing minor work for related areas.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Phil. 101. Ancient Philosophy (3). First semester. Robinson.
- Phil. 102. Modern Philosophy (3). Second semester. Prerequisite, Phil. 101. Robinson.
- Phil. 111. Medieval Philosophy (3). Second semester. (Offered in 1952-1953, and alternatively with Phil. 160.) Prerequisite, Phil. 101. Robinson.
- Phil. 112. Recent and Contemporary Philosophy (3). First semester. Prerequisite, Phil. 101 and 102, or written permission of instructor. Dewey.
- Phil. 121. American Philosophy (3). First semester. (Offered in 1952-1953, and alternatively with Phil. 153.) Dewey.
- Phil. 151. Ethics (3). First semester. Prerequisite, Phil. 2, or one year of Phil. Baylis.
- Phil. 153. Philosophy of Art (3). First semester. (Offered in 1952-1953, and alternatively with Phil. 121.) Dewey.
- Phil. 154. Political and Social Philosophy (3). Second semester. Dewey.
- Phil. 155. Logic (3). Each semester. Baylis.
- Phil. 156. Philosophy of Science. (3). First semester. Robinson.
- Phil. 160. Metaphysics (3). Second semester. (Offered in 1951-1952, and alternatively with Phil. 111.) Prerequisite, Phil. 101 and 102, or the written permission of the instructor. Robinson.
- Phil. 191, 192, 193, 194. Topical Investigations (1-3). Each semester. Staff.



## FOR GRADUATES

Graduate instruction in the Department of Philosophy is carried on mainly by independent investigation of special topics under individual supervision. Any of the courses listed below may be elected more than once. Course selections require the approval of the department chairman.

- Phil. 201. Research in Philosophy (3). Each semester. Staff.  
 Phil. 203. Selected Problems in Philosophy (3). Each semester. Staff.  
 Phil. 205. Seminar in the History of Philosophy (3). First semester. Staff.  
 Phil. 206. Seminar in the Problems of Philosophy (3). Second semester. Staff.

## PHYSICAL EDUCATION, RECREATION AND HEALTH

Dean Fraley; Professor Deach; Associate Professors Cronin, Johnson, Kehoe, Massey, Mohr, Shipley, Tompkins, Woods; Assistant Professors Cudmore, Field, Flinchbaugh, Gladish, Harvey, Holloway, Husman, Krotuse, Mitchell, Ross, Wisher; Instructors Haverstick, Howarth, La Rue, Madden.

The graduate student majoring in Physical Education, Recreation, or Health Education may pursue any of the following degrees: Master of Education, Master of Arts in Education, Doctor of Education, and Doctor of Philosophy. Undergraduate requirements to be made of every candidate before admission to candidacy for a graduate degree in Physical Education are: basic sciences (human anatomy and physiology, physiology of exercise), kinesiology, therapeutics, sport skills, methods, human development, measurement, principles, administration, and student teaching. In cases where a student has had successful experience in teaching Physical Education, the prerequisites of sport skills, methods, and student teaching may be waived. Undergraduate prerequisites in Recreation are: psychology, sociology, principles, administration, basic sciences, recreational activities, and practical experience. Undergraduate prerequisites in Health Education are: biological sciences, bacteriology, human anatomy and physiology, nutrition, chemistry, psychology, measurement, administration, principles, and field work.

Every graduate student majoring in Physical Education, Recreation, or Health Education is required to take the following courses (or transfer their equivalent) before taking the qualifying examination: P. E. 201, Foundations in Physical Education, Recreation, and Health; P. E. 210, Methods and Techniques of Research in Physical Education, Recreation, and Health; and P. E. 230, Survey Techniques in Physical Education, Recreation, and Health. In addition, every graduate student must register for and complete P. E. 200, Seminar in Physical Education, Recreation, and Health, at some time during his graduate career.

## A. Physical Education

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- P. E. 160. Therapeutics (3). First and second semesters. Prerequisite, P. E. 100. Cudmore.

- P. E. 170. Principles and Philosophy of Physical Education (3). First and second semesters. Johnson.
- P. E. 180. Measurement in Physical Education and Health (3). First and second semesters. Two lectures and two laboratory periods a week. Wisher.
- P. E. 181. Training and Conditioning (3). Second semester. Two lectures and two laboratory periods a week. Prerequisites, Zool. 14, 15, 53. Wyre.
- P. E. 182. History of Dance (3). First semester. Prerequisites, P. E. 52, 54, 56, 58, or permission of instructor. Madden.
- P. E. 190. Administration and Supervision of Physical Education, Recreation and Health (3). First and second semesters, and summer. Johnson.

## FOR GRADUATES

- P. E. 200. Seminar in Physical Education, Recreation and Health (1). First and second semesters and summer. Staff.
- P. E. 201. Foundations in Physical Education, Recreation and Health (3). First and second semesters and summer. Deach, Johnson.
- P. E. 203. Supervisory Techniques in Physical Education, Recreation and Health (3). First and second semesters and summer. Mohr.
- P. E. 205. Administration of Athletics (3). First and second semesters and summer. Fraley.
- P. E. 210. Methods and Techniques of Research (3). First and second semesters and summer. Mohr.
- P. E. 220. Quantitative Methods (3). First and second semesters and summer. Massey.
- P. E. 230. Source Material Survey (3). First and second semesters and summer. Massey.
- P. E. 250. Mental and Emotional Aspects of Physical Education Activities (3). First and second semesters and summer. Johnson.
- P. E. 280. Scientific Bases of Physical Fitness (3). First and second semesters and summer. Massey.
- P. E. 288. Research (1-6). First and second semesters and summer. Staff.
- P. E. 289. Thesis (1-6). First and second semesters and summer. Staff.
- P. E. 290. Administrative Director of Physical Education, Recreation and Health (3). First and second semesters and summer. Johnson.
- P. E. 291. Curriculum Construction (3). First and second semesters and summer. Mohr.

**B. Health Education**

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

Hea. 130. Organization and Administration of Health Education (3).  
Gladish.

Hea. 160. Problems in School Health Education (4-6). Summer only.  
Gladish.

## FOR GRADUATES

Hea. 220. Principles and Practices of Health Education (3). First and  
second semesters and alternate summers. Gladish.

Hea. 230. Public Health Education (3). First and second semesters and  
summer. Gladish.

Hea. 240. Advancements in Modern Health (3). First and second semes-  
ters and summer. Gladish.

**C. Recreation**

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

Rec. 130. Principles and Practice of Recreation (3). First and second  
semesters. Harvey.

Rec. 150. Camp Management (3). First and second semesters and sum-  
mer. Harvey.

Rec. 170. Organization and Administration of Recreation (3). First and  
second semesters. Harvey.

Rec. S184. Outdoor Education (6). Summer only. Mitchell.

## FOR GRADUATES

Rec. 210. Modern Trends in Recreation (3). First and second semesters  
and summer. Harvey.

Rec. 220. Hospital Recreation (3). First and second semesters and  
summer. Harvey.

Rec. 230. Industrial Recreation (3). First and second semesters and sum-  
mer. Harvey.

**PHYSICS**

Professors Morgan, Myers; Part-time Professors Brickwedde, Johnson, Ken-  
nard, McMillen; Associate Professor Iskraut; Assistant Professors Grant,  
Krumbein, Wangsness.

It is expected that the following courses should have been taken prelim-  
inary to graduate work. Any deficiencies should be made up at once. A  
limited amount of graduate credit will be allowed for courses so taken.

General Physics

Heat

Intermediate Mechanics

Optics

Electricity and Magnetism

Modern Physics

Differential and Integral Calculus

Candidates for both the Master's and Doctor's degree are required to take Introduction to Theoretical Physics, (Physics 200). The course runs for a full year and carries 10 semester hours credit. The minimum prerequisites in mathematics are differential and integral calculus, but advanced calculus and differential equations are recommended.

Candidates for the Doctor's degree should follow the Introduction to Theoretical Physics with Quantum Mechanics. No other courses are specifically required. It is recommended in the selection of further courses that the student avoid overspecialization in any field. In particular he should take a wide variety of classical courses as well as courses in selected fields of Modern Physics.

Candidates for advanced degrees in Physics may have a minor in either chemistry, mathematics, engineering, applied physics, or a satisfactory combination of two or more of the group.

**Thesis (Ph. D.):** The student must outline his topic to the graduate staff for approval. This outline must clearly set forth the nature of the problem, proposed method of procedure and the possible results that may be obtained. The completed thesis will also be presented to the graduate staff for approval.

**Off-Campus Courses:** The Physics Department offers courses at convenient times and places so as to accommodate the greatest number of students. In order to facilitate graduate study and supervision of research in the Washington area, the Department has part-time professors in certain government laboratories where a large number of students are interested in graduate study and where there are facilities for research. At government agencies where there is no part-time professor, employees desiring to do graduate work in physics should contact a member of the graduate staff in the Physics Department.

### A. General Physics

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Phys. 100. Advanced Experiments.** Three hours of laboratory work for each credit hour. One or more credits may be taken concurrently. Prerequisites, Phys. 52 or 54 and one credit in Phys. 60. Laboratory fee, \$6.00 per credit hour. Krumbein.

**Phys. 102. Optics (3).** Three lectures a week, second semester. Prerequisites, Phys. 11 or 21; Math. 21. Myers.

**Phys. 104. Electricity and Magnetism (4).** Four lectures a week, first semester. Prerequisites, Phys. 11 or 21; Math. 21. Grant.

**Phys. 106, 107. Theoretical Mechanics (3, 3).** Three lectures a week, first and second semesters. Prerequisites, Phys. 51 or consent of instructor. Morgan.

**Phys. 112, 113. Modern Physics (2, 2).** Two lectures a week. Myers.

**Phys. 120, 121. Experimental Nuclear Physics (3, 3).** Off-campus. Two lectures and one laboratory a week. Prerequisite, Phys. 113 and two credits of Phys. 100. Johnson.

**Phys. 126. Kinetic Theory of Gases (3).** Off-campus. Prerequisites, Phys. 107 and Math. 21, or equivalent.

#### FOR GRADUATES

Of the following courses, 200, 201, 212 and 213 are given every year; all others will be given according to the demand.

**Phys. 200, 201. Introduction to Theoretical Physics (5, 5).** Five lectures a week, first and second semesters. Myers.

**Phys 202, 203. Advanced Dynamics (2, 2).** Two lectures a week. Prerequisite, Phys. 200. Bershader.

**Phys. 204. Electrodynamics (4).** Four lectures a week. Prerequisite, Phys. 201. Iskraut.

**Phys. 206. Physical Optics (3).** Prerequisite, Phys. 201. Myers.

**Phys. 208, 209. Thermodynamics (2, 2).** Prerequisite, Phys. 201 or equivalent. Betchor.

**Phys. 210, 211. Statistical Mechanics and the Kinetic Theory of Gases (2, 2).** Two lectures a week. Prerequisites, Phys. 112 and 201. McMillen.

**Phys. 212, 213. Introduction to Quantum Mechanics (3, 3).** Three lectures a week, first and second semesters. Prerequisite, Phys. 213. Wangsness.

**Phys. 214, 215. Theory of Atomic Structure and Spectral Lines (2, 2).** Two lectures a week. Prerequisite, Phys. 213. McMillen.

**Phys. 216, 217. Molecular Structure (2, 2).** Two lectures a week. Prerequisite, Phys. 213. Brickwedde.

**Phys. 222, 223. Boundary-Value Problems of Theoretical Physics (2, 2).** Prerequisite, Phys. 201.

**Phys. 228, 229. The Electron (2, 2).** Prerequisites, Phys. 204 and Phys. 213. Johnson.

**Phys. 230. Seminar (1).** First and second semesters.

**Phys. 234, 235. Nuclear Physics (2, 2).** Prerequisite, Phys. 213. Johnson.

**Phys. 236. Theory of Relativity (3).** Prerequisite, Phys. 200. Iskraut.

**Phys. 238. Quantum Theory—selected topics (3).** Prerequisite, Phys. 236. Iskraut.

**Phys. 242, 243. Theory of Solids (2, 2).** Two lectures a week, first and second semesters. Prerequisite, Phys. 213. Myers.

**Phys. 250. Research.** Credit according to work done. Laboratory fee, \$6.00 per credit hour.

### B. Applied Physics

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Phys. 101. Laboratory Arts (1).** Four hours laboratory a week, second semester. Prerequisite, two credits of Phys. 100. Laboratory fee, \$6.00. Morgan.

**Phys. 103. Applied Optics (3).** Three lectures a week, first semester. Prerequisite, Phys. 102.

**Phys. 105. Electricity and Magnetism (2).** Two lectures a week, second semester. Prerequisite, Phys. 104. Grant.

**Phys. 108. Physics of Vacuum Tubes (3).** Three lectures a week, first semester. Prerequisite, Phys. 104. Grant.

**Phys. 109. Electronic Circuits (5).** Five lectures a week, second semester. Prerequisite, Phys. 105. Grant.

**Phys. 110. Applied Physics Laboratory (1, 2, or 3).** Three hours laboratory work for each credit hour. One to three credits may be taken concurrently. Prerequisites, Phys. 52 or Phys. 54; and two credits in Phys. 60. Krumbein.

**Phys. 116, 117. Fundamental Hydrodynamics (3, 3).** Three lectures a week. Prerequisites, Phys. 107 and Math. 21.

#### FOR GRADUATES

**Phys. 218, 219. X-Rays and Crystal Structure (3, 3).** Three lectures a week, first and second semesters. Morgan.

**Phys. 220. Application of X-Ray and Electron Diffraction Methods (2).** Two laboratory periods a week. Morgan.

**Phys. 224, 225. Supersonic Aerodynamics and Compressible Flow (2, 2).** Prerequisite, Phys. 201. McMillen.

**Phys. 226, 227. Theoretical Hydrodynamics (3, 3).** Prerequisite, Phys. 201.

**Phys. 232, 233. Hydromechanics Seminar (1, 1).** Kennard.

**Phys. 240, 241. Theory of Sound and Vibrations (3, 3).** Prerequisite, Phys. 201. McMillen.

**Phys. 244, 245. Aerophysics (2, 2).** Prerequisite, consent of the instructor. Seeger.

**Phys. 246, 247. Special Topics in Fluid Dynamics (2, 2).** Prerequisites, advanced graduate standing and consent of the instructor. McMillen.

**POULTRY HUSBANDRY**

Profesors Jull, Shaffner, Combs.

Course work and research leading to the Master of Science and the Doctor of Philosophy are offered.

**FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- P. H. 104. Poultry Marketing (3). Two lectures and one laboratory period a week, first semester.
- P. H. 105. Egg Marketing (3). Two lectures and one laboratory period a week, second semester.
- P. H. 107. Poultry Industrial and Economic Problems (2). First semester. Staff.
- P. H. 108. Special Poultry Problems (1-2). Assigned problems, first and second semesters. Staff.
- Poultry Hygiene. See V. S. 107.
- Avian Anatomy. See V. S. 108.

**FOR GRADUATES**

- P. H. 201. Advanced Poultry Genetics (3). First semester. Prerequisite, P. H. 100, or equivalent. Jull.
- P. H. 202. Advanced Poultry Nutrition (3). Two lectures and one laboratory period a week, second semester. Prerequisite, P. H. 101, or equivalent. Combs.
- P. H. 203. Physiology of Reproduction of Poultry (3). Two lectures and one laboratory period a week, first semester. Prerequisite, P. H. 102, or equivalent. Shaffner.
- P. H. 204. Poultry Seminar (1). First and second semesters. Staff.
- P. H. 205. Poultry Literature (1-4). First and second semesters. Staff.
- P. H. 206. Poultry Research (1-6). Credit in accordance with work done. Staff.
- P. H. 207. Poultry Research Techniques (2). One lecture and one laboratory period a week, first semester. Staffner, Combs.

**PSYCHOLOGY**

Professors Andrews, Smith, Sprowls; Associate Professors Ayers, Cofer, Hackman, Ross, Schaefer, Triggs; Assistant Professor Heintz.

All graduate students who have deficiencies in their undergraduate preparation in psychology will be required to remove the particular deficiencies by completing the required courses or by individual study. Deficiencies in the following course areas can be removed only by regis-

tering in and satisfactorily completing these courses: Experimental Psychology, Statistical Methods, and Tests and Measurements.

Departmental requirements toward the Master of Arts or the Master of Science degrees: 15 hours in the following courses: Psych. 191-192, 198, and 252-253; 6 hours of research (Psych. 290-291); a minimum of 6 hours in advanced courses in area of specialization; and 9 hours in an approved minor field; total 36 hours.

Departmental requirements toward the Doctor of Philosophy degree: 27 hours in the following courses, Psych. 191-192, 198, 202, 203, 205-206, 252-253; 12 hours of research for thesis (Psych. 290-291); a minimum of 27 hours in areas of specialization; and 24 hours in approved minor fields; total 90 hours.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

Graduate credit will be assigned only for students certified by the Department of Psychology as qualified for graduate standing.

- Psych. 106 Statistical Methods in Psychology (3).** First and second semesters. Prerequisite, Psych. 1. Schaefer.
- Psych. 110. Advanced Educational Psychology (3).** First semester. Prerequisite, Psych. 1 or H. D. Ed. 101. Heintz.
- Psych. 121. Social Psychology (3).** First and second semesters. Prerequisite, Psych. 1. Heintz.
- Psych. 122. Advanced Social Psychology (3).** Second semester. Prerequisite, Psych. 121 and consent of instructor. Heintz.
- Psych. 125. Child Psychology (3).** First semester. Prerequisite, Psych. 1. Heintz.
- Psych. 126. Developmental Psychology (3).** First semester. Prerequisite, Psych. 1. Heintz.
- Psych. 128. Human Motivation (3).** First and second semesters. Prerequisite, Psych. 121. Cofer.
- Psych. 129. Psychological Aspects of Literature (3).** First semester. Prerequisite, Psych. 1 and permission of instructor. Sprowls.
- Psych. 131. Abnormal Psychology (3).** First and second semesters. Prerequisite, 3 courses in Psychology. Sprowls.
- Psych. 136. Applied Experimental Psychology (3).** First semester. Prerequisite, Psych. 1 or 3. Ross.
- Psych. 140. Psychological Problems in Advertising (3).** First semester. Prerequisite, Psych. 1. Hackman.
- Psych. 142. Techniques of Interrogation (3).** First and second semesters. Prerequisite, Psych. 121. Hackman.



- Psych. 145. Introduction to Experimental Psychology (4).** First and second semesters. Prerequisite, Psych. 4. Laboratory fee, \$4.00. Ross.
- Psych. 150. Tests and Measurements (3).** First semester. Prerequisite, Psych. 106. Laboratory fee, \$4.00. Smith.
- Psych. 155. Psychological Techniques in Vocational Counseling (3).** Second semester. Prerequisite, Psych. 150. Smith.
- Psych. 161. Psychological Techniques in Personnel Administration (3).** Second semester. Prerequisite, 6 hours in psychology. Schaefer, Ayers.
- Psych. 167. Psychological Problems in Aviation (3).** (Not offered 1951-1952). Second semester. Prerequisite, Psych. 1.
- Psych. 180. Physiological Psychology (3).** First semester. Prerequisite, Psych. 145. Andrews, Ross.
- Psych. 181. Animal Behavior (3).** (Same as Zool. 181). Second semester. Prerequisite, consent of instructor. Ross.
- Psych. 191, 192. Advanced General Psychology (3, 3).** First and second semesters. Prerequisite, Psych. 145. Ross.
- Psych. 194. Independent Study in Psychology (1-3).** First and second semesters. Prerequisite, consent of instructor. Staff.
- Psych. 195. Minor Problems in Psychology (1-3).** First and second semesters. Prerequisite, consent of individual faculty supervisor. Staff.
- Psych. 198. Proseminar: Professional Aspects of Psychological Science (3).** Second semester. Prerequisite, consent of instructor. Staff.

## FOR GRADUATES

- Psych. 202. Seminar in Advanced Experimental Psychology (3).** First semester. Prerequisite, permission of instructor. Andrews.
- Psych. 203, 204. Graduate Seminar (3, 3).** First and second semesters. Prerequisite, consent of instructor. Staff.
- Psych. 205, 206. Historical Viewpoints and Current Theories in Psychology (3, 3).** (Not offered 1951-1952). First and second semesters. Hackman, Cofer.
- Psych. 210. Occupational Information (3).** Second semester. Prerequisite, permission of instructor. Ayers.
- Psych. 211. Job Analysis and Description (3).** First semester. Prerequisite, permission of instructor. Ayers.
- Psych. 220, 221. Counseling Techniques (3, 3).** First and second semesters. Prerequisite, permission of instructor. Smith.
- Psych. 222. Rehabilitation Techniques (3).** (Not offered 1951-1952). Second semester. Prerequisite, Psych. 220. Triggs.

- Psych. 223. **Diagnosis and Correction of Reading Difficulties (3).** Second semester. Prerequisite, Psych. 221. Triggs.
- Psych. 225. **Participation in Counseling Clinic (3).** First semester. Prerequisite, Psych. 221. Smith.
- Psych. 230. **Determinants of Human Efficiency (3).** Second semester. Ayers, Hackman.
- Psych. 231. **Training Procedures in Industry (3).** First semester. Ayers.
- Psych. 233. **Social Organization in Industry (3).** Second semester. Ayers.
- Psych. 235. **Psychological Aspects of Management-Union Relations (3).** Second semester. Prerequisite, consent of instructor. Ayers.
- Psych. 240. **Interview and Questionnaire Techniques (3).** Second semester. Prerequisite, Psych. 150. Heintz.
- Psych. 241. **Controlled Publicity (3).** First semester. Prerequisite, consent of instructor. Hackman.
- Psych. 250. **Mental Test Theory (3).** First semester. Prerequisite, Psych. 253. Schaefer.
- Psych. 251. **Development of Predictors (3).** Second semester. Prerequisite, Psych. 253. Schaefer.
- Psych. 252, 253. **Advanced Statistics (3, 3).** First and second semesters. Prerequisite, Psych. 106. Hackman, Andrews.
- Psych. 255. **Seminar in Psychometric Theory (3).** Second semester. Prerequisite, Psych. 253. Andrews, Hackman, Schaefer.
- Psych. 260, 261. **Individual Tests (3, 3).** First and second semesters. Prerequisite, Psych. 150. Laboratory fee, \$4.00. Triggs.
- Psych. 262. **Appraisal of Personality (3).** (Not offered 1951-1952). First semester. Prerequisite, Psych. 150.
- Psych. 264, 265. **Projective Tests (3, 3).** First and second semesters. Prerequisite, Psych. 260. Laboratory fee, \$4.00 Cofer.
- Psych. 266, 267. **Theories of Personality and Motivation (3, 3).** (Not offered 1951-1952). First and second semesters. Cofer.
- Psych. 270. **Advanced Abnormal Psychology (3).** First semester. Prerequisite, Psych. 131. Cofer.
- Psych. 271. **Special Testing of Disabilities (3).** Second semester. Prerequisite, Psych. 270. Triggs.
- Psych. 272, 273. **Individual Clinical Diagnosis (3, 3).** First and second semesters. Prerequisite, Psych. 260. Cofer.
- Psych. 278. **Seminar in Clinical Psychology for Teachers (3).** First semester. Prerequisite, consent of instructor. Sprowls.

**Psych. 280. Advanced Psychophysiology (3).** Second semester. Prerequisite, consent of instructor. Andrews.

**Psych. 290, 291. Research for Thesis (credit arranged).** First and second semesters. Staff.

### SOCIOLOGY

Professors Hoffsommer, Lejins; Visiting Professor Bailey; Associate Professors Hutchinson, Matthews, Melvin, Shankweiler; Assistant Professors de Give, Cussler.

The Department of Sociology grants the degrees of Master of Arts and Doctor of Philosophy. As indicated by the courses listed, the student has a considerable range of choice in selecting specialized fields of sociological study.

Prerequisites for graduate study leading to an advanced degree with a major in sociology consist of either (1) an undergraduate major (totalling at least 24 semester hours) in sociology or (2) 12 semester hours of sociology (including 6 semester hours of advanced courses) and 12 additional hours of comparable work in economics, political science, or psychology. Reasonable substitutes for these prerequisites may be accepted in the case of students majoring in other departments who desire a graduate minor or several courses in sociology.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Soc. 105. Applied Anthropology (3).** Second semester. Hutchinson.

**Soc. 112. Rural-Urban Relations (3).** First semester. Melvin.

**Soc. 113. The Rural Community (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Hoffsommer.

**Soc. 114. The City (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Bailey.

**Soc. 115. Industrial Sociology (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Imse.

**Soc. 118. Community Organization (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Bailey.

**Soc. 121, 122. Population (3, 3).** Three hours a week, first and second semesters. Prerequisite, Soc. 1, or its equivalent. Imse.

**Soc. 123. Ethnic Minorities (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.

**Soc. 124. The Culture of the American Indian (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Hutchinson.

**Soc. 131. Introduction to Social Service (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Roth.

- Soc. 136. **Sociology of Religion (3)**. First semester. Prerequisite, Soc. 1, or equivalent. Bailey.
- Soc. 141. **Sociology of Personality (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Cussler.
- Soc. 144. **Collective Behavior (3)**. Second semester. Prerequisite, Soc. 1, or its equivalent. Ebersole.
- Soc. 145. **Social Control (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Ebersole.
- Soc. 147. **Sociology of Law (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.
- Soc. 153. **Juvenile Delinquency (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.
- Soc. 154. **Crime and Delinquency Prevention (3)**. Second semester. Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.
- Soc. 156. **Institutional Treatment of Criminals and Delinquents (3)**. Second semester. Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.
- Soc. 161. **The Sociology of War (3)**. First semester. Bailey.
- Soc. 171. **Family and Child Welfare (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Shankweiler.
- Soc. 173. **Social Security (3)**. First semester. Prerequisite, Soc. 1, or its equivalent. Hutchinson.
- Soc. 174. **Public Welfare (3)**. Second semester. Prerequisite, Soc. 1, or its equivalent. Roth.
- Soc. 183. **Social Statistics (3)**. Second semester. Prerequisite, Soc. 1, or its equivalent. Imse.
- Soc. 185. **Advanced Social Statistics (3)**. Second semester. Prerequisite, Soc. 183, or its equivalent. Imse.
- Soc. 186. **Sociological Theory (3)**. Second semester. Prerequisite, Soc. 1, or its equivalent. Bailey.
- Soc. 196. **Senior Seminar (3)**. Second semester. Hoffsommer.

## FOR GRADUATES

- Soc. 201. **Methods of Social Research (3)**. First semester. Hoffsommer.
- Soc. 215. **Community Studies (3)**. First semester. Hoffsommer.
- Soc. 221. **Population and Society (3)**. Second semester. Staff.
- Soc. 224. **Race and Culture (3)**. Second semester. Hutchinson.

Soc. 241.	Personality and Social Structure (3).	Second semester.	Staff.
Soc. 246.	Public Opinion and Propaganda (3).	Second semester.	Staff.
Soc. 253.	Advanced Criminology (3).	First semester.	Lejins.
Soc. 254.	Seminar: Criminology (3).	Second semester.	Lejins.
Soc. 255.	Seminar: Juvenile Delinquency (3).	First semester.	Lejins.
Soc. 256.	Crime and Delinquency as a Community Problem (3).	Second semester.	Lejins.
Soc. 257.	Social Change and Social Policy (3).	First semester.	Staff.
Soc. 262.	Family Studies (3).	Second semester.	Shankweiler.
Soc. 282.	Sociological Methodology (3).	Second semester.	Staff.
Soc. 285.	Seminar: Sociological Theory (3).	First semester.	Bailey.
Soc. 290.	Research in Sociology.	Credit to be determined.	Staff.
Soc. 291.	Special Social Problems.	First and second semesters.	Credit to be determined.
			Staff.

### SPEECH AND DRAMATIC ART

Professor Ehrensberger; Associate Professors Ansberry, Strausbaugh; Assistant Professors Provinsen, Niemeyer, Batka, Hendricks, Linkow; Instructors Mayer, Coppinger, Pugliese, Starcher, Golden, Palmer, Bowers, Meeker, McQuade, Hall, Aylward.

Forest Glen Staff: Glorig, Senft, Walker, Paille, Bartlett.

The Department offers work leading to the Master of Arts degree in the field of Speech Pathology and Correction.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

Speech 101.	Radio Speech (3).	First semester.	Prerequisite, Speech 4, Laboratory fee, \$2.00.	Batka.
Speech 102.	Radio Production (3).	Second semester.	Prerequisite, consent of instructor. Laboratory fee, \$2.00.	Batka.
Speech 103, 104.	Speech Composition and Rhetoric (3, 3).	First and second semesters.	(Not offered 1950-51.)	Golden.
Speech 105.	Pathology (3).	Second semester.	Prerequisite, Speech 112.	Ansberry.
Speech 106.	Clinic (3).	Second semester.	Prerequisites, Speech 105, 120.	Ansberry.
Speech 107.	Advanced Oral Interpretation (3).	Second semester.	Prerequisite, Speech 13.	Provinsen.
Speech 110.	Teacher Problems in Speech (3).	Second semester.	For students who intend to teach.	Hendricks.

- Speech 111. Seminar (3). Second semester. Ehrensberger.
- Speech 112. Phonetics (3). First semester. Ansberry.
- Speech 113. Play Production (3). Second semester. Harris and Staff.
- Speech 114. Costuming (3). First semester. One lecture and two laboratories a week. (Not offered 1950-1951.) Bowers.
- Speech 115. Radio in Retailing (3). First semester. Prerequisites, Speech 1, 2; English 1, 2. Laboratory fee, \$2.00. Batka.
- Speech 116. Radio Announcing (3). Second semester. Prerequisite, Speech 101. Laboratory fee, \$2.00. Batka.
- Speech 117. Radio Continuity Writing (3). First semester. Admission by consent of instructor. Coppinger.
- Speech 118. Advanced Radio Writing (3). Second semester. Prerequisites, Speech 117 and consent of instructor. Coppinger.
- Speech 119. Radio Acting (3). Second semester. Admission by consent of the instructor. Batka.
- Speech 120. Speech Pathology (3). First semester. Prerequisite, Speech 105. A continuation of Speech 105. Ansberry.
- Speech 121. Stage Design (3). Second semester. Prerequisites, Speech 14, 15, and consent of the instructor. Bowers.
- Speech 122, 123. Radio Workshop (3, 3). First and second semesters. Admission by consent of instructor. Laboratory fee, \$2.00. Batka.
- Speech 126. Semantic Aspects of Speech Behavior (3). First semester. Hendricks.
- Speech 131. History of the Theatre (3). First semester. Niemeyer.
- Speech 132. History of the Theatre (3). Second semester. Niemeyer.

#### FOR GRADUATES

The Department maintains a reciprocal agreement with Walter Reed General Hospital whereby clinical practice may be obtained at the Army Audiology and Speech Correction Center, Forest Glen, Maryland.

- Speech 200. Thesis (3-6). Credit in proportion to work done and results accomplished. Ehrensberger.
- Speech 201. Special Problems (2-4). Arranged. Ehrensberger.
- Speech 210. Anatomy and Physiology of Speech and Hearing (3). Glorig.
- Speech 211. Advanced Clinical Practice (3). Glorig.
- Speech 212. Advanced Speech Pathology (3). Senft.
- Speech 213. Speech Problems of the Hard of Hearing (3). Senft.
- Speech 214. Clinical Audiometry (3). Walker.

- Speech 215. Auditory Training (3). Paille.  
 Speech 216. Speech Reading (3). Bartlett and Staff.  
 Speech 217. Clinical Practice in the Selection of Prosthetic Appliances (3). Walker and Staff.  
 Speech 218. Problems of Hearing and Deafness (3). Cornell and Staff.

### VETERINARY SCIENCE

Professors Brueckner, DeVolt, Poelma; Associate Professors Coffin, Reagan.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- V. S. 101. Comparative Anatomy (3). Two lectures and one laboratory period a week, first semester Coffin.  
 V. S. 102. Animal Hygiene (3). Two lectures and one laboratory period a week, second semester. Coffin.  
 V. S. 103. Regional Comparative Anatomy (3). One lecture and one laboratory period a week, first semester. Coffin.  
 V. S. 104. Advanced Regional Comparative Anatomy (2). Two laboratory periods a week, second semester. Coffin.  
 V. S. 107. Poultry Hygiene (3). Two lectures and one laboratory period a week, second semester. DeVolt.  
 V. S. 108. Avian Anatomy (3). Two lectures and one laboratory period a week, first semester. DeVolt.

#### FOR GRADUATES

- V. S. 201. Animal Disease Problems (2-6). Arranged. Poelma, DeVolt, Brueckner.  
 V. S. 202. Animal Disease Research. Arranged. Poelma, DeVolt, Brueckner.  
 V. S. 203. Electron Microscopy (2). One lecture and one laboratory period a week, second semester. Reagan, Brueckner.

### ZOOLOGY

Professors Phillips, Burhoe; Lecturers King, Lemon, Reynolds; Associate Professor Littleford; Instructors Allen, Bartlett, Grollman, Stringer.

The Department of Zoology offers work leading to the Master of Science and the Doctor of Philosophy degrees. The special fields in which graduate students may emphasize in working toward these degrees are Embryology, Genetics, Fishery Biology, Physiology, and Microscopic Anatomy.

The requirements which must be fulfilled for these degrees are the same as those general requirements described earlier in the catalog. Graduate students who are emphasizing their work in Fishery Biology may be requested to spend part of their summers in field work on the waters of the Chesapeake Bay or inland streams.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Zool. 101. Mammalian Anatomy (3).** Three three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisite, permission of instructor. Stringer.
- Zool. 102. General Animal Physiology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisites, one year of Chemistry, one course in Zoology. Phillips.
- Zool. 104. Genetics (3).** Three lecture periods a week, first semester. Prerequisite, one course in Zoology or Botany. Burhoe.
- Zool. 108. Animal Histology (4).** Two lecture and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, one year of Zoology. Stringer.
- Zool. 110. Parasitology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, one year of Zoology.
- Zool. 116. Protozoology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisites, Histology; Bacteriology desirable.
- Zool. 118. Invertebrate Zoology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisites, General Zoology and Vertebrate Embryology. Allen.
- Zool. 121. Principles of Animal Ecology (3).** Two lectures and one three-hour laboratory period a week, second semester. Laboratory fee, \$8.00. Prerequisites, one course in Zoology and one course in Chemistry. Allen.
- Zool. 125, 126. Fishery Biology and Management (3, 3).** Two lectures and one three-hour laboratory period a week, first and second semesters. Prerequisite, consent of instructor. Laboratory fee on 125, \$8.00. Allen.
- Zool. 130. Aviation Physiology (3).** Three lectures a week, second semester. Prerequisite, permission of the instructor. Reynolds.
- Zool. 132. Applied Physiology (3).** Three lectures a week, first semester. Prerequisite, permission of the instructor. King.

## FOR GRADUATES

- Zool. 200. Ichthyology and Marine Zoology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Littleford.
- Zool. 201. Microscopical Anatomy (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory Fee, \$8.00.
- Zool. 202. Animal Cytology (4).** Two lecture and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. (———.)



- Zool. 203. Advanced Embryology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Burhoe.
- Zool. 204. Advanced Animal Physiology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Phillips.
- Zool. 205. Hydrobiology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Littleford.
- Zool. 206. Research.** Credit to be arranged. First and second semesters. Laboratory fee, \$8.00. Staff.
- Zool. 207. Zoology Seminar (1).** One lecture a week, first and second semesters. Staff.
- Zool. 208. Special Problems in General Physiology.** Hours and credits arranged. Second semester. Laboratory fee, \$8.00. Phillips.
- Zool. 215. Fishery Technology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Prerequisite, consent of instructor. Lemon.
- Zool. 220. Advanced Genetics (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, Zool. 104. Burhoe.

## SCHOOL OF DENTISTRY

### ANATOMY

Professor Hahn; Associate Professor Thompson; Instructor Hewes.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Anatomy 111. Human Gross Anatomy (8).** Two lectures and two laboratory periods per week throughout the year. Hahn, Thompson, Hewes.
- Anatomy 113. Human Neuroanatomy (2).** Two lectures and two laboratory periods for eight weeks. Hahn, Thompson, Hewes.

#### FOR GRADUATES

- Anatomy 211. Human Gross Anatomy.** Credits to be arranged. Same as course 111 but with additional instruction. Hahn, Thompson.
- Anatomy 213. Human Neuroanatomy.** Credits to be arranged. Same as course 113 but with additional instruction. Hahn, Thompson.
- Anatomy 214. The Anatomy of the Head and Neck (1).** One lecture and two laboratory periods with conferences per week for one semester. Hahn, Thompson.
- Anatomy 216. Research.** Time and credit by arrangement. Staff.

**BACTERIOLOGY**

See Bacteriology Courses listed under "School of Pharmacy."

**BIOCHEMISTRY**

Professor Vanden Bosche; Instructor Edberg.

**FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**Biochemistry 111. Principles of Biochemistry (6).** Two lectures, one conference and one laboratory period per week throughout the year.

Vanden Bosche, Edberg.

**FOR GRADUATES**

**Biochemistry 211. Advanced Biochemistry.** Time and credits by arrangement.

Vanden Bosche, Edberg.

**Biochemistry 212. Research in Biochemistry.** Time and credits by arrangement. Prerequisite, 211.

**HISTOLOGY AND EMBRYOLOGY**

Professor McCrea; Instructor Cooksey.

**FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**Histology 112. Mammalian Histology and Embryology (6).** Two lectures and two laboratory periods per week throughout the year.

McCrea, Cooksey.

**FOR GRADUATES**

**Histology 212. Mammalian Histology and Embryology.** Number of credits by arrangement. Same as course 112 but with additional instruction and collateral reading of a more advanced nature.

McCrea.

**Histology 213. Mammalian Oral Histology and Embryology.** Number of credits by arrangement.

McCrea.

**Research in Histology 214.** Number of hours and credit by arrangement. Prerequisite, 112 or 212.

Staff.

**Research in Embryology 215.** Number of hours and credit by arrangement. Prerequisites by arrangement.

Staff.

**PHYSIOLOGY**

Professor Oster; Instructors Shipley, Pollack.

This Department offers work leading toward the degree of Master of Science. The general requirements for this degree are set forth in the section of this catalog entitled "Requirements for the Degree of Master of Arts and Master of Science."

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Physiology 111. Principles of Physiology (6).** Sixty-six lectures and seventy-two hours of laboratory work throughout the year. For details of scheduling, consult the Dental School catalog.

Oster, Shipley, Pollack.

## FOR GRADUATES

**Physiology 211. Principles of Mammalian Physiology.** Credits to be arranged. Same as course 111 but with additional instruction and collateral reading.

Oster, Shipley, Pollack.

**Physiology 212. Advanced Physiology.** Lecture and seminar during the second semester. Hours and credit by arrangement.

Oster, Shipley, Pollack.

**Physiology 213. Research.** Credit and hours by arrangement.

Oster, Shipley, Pollack.

## SCHOOL OF MEDICINE\*

## ANATOMY

## A. Gross Anatomy

Professor Uhlenhuth; Associate Professor Krah1; Associate Mech;  
Instructors Phelan, Wadsworth.

The graduate degrees offered by the Department of Gross Anatomy are the Master of Science and the Doctor of Philosophy.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Anat. 101. Human Gross Anatomy (8).** Total number of hours approximately 350. Four conferences and lectures, 18 laboratory hours per week, throughout the first semester.

Uhlenhuth, Krah1, Mech, Phelan, Wadsworth.

**Anat. 102. Osteology of the Human Skull (1).** One period of one hour once a week, for 10 weeks; Wednesdays from 1 to 2 p. m., from September to December, inclusive.

Uhlenhuth.

**Anat. 103. The Peripheral Nervous System (1).** One period of two hours once a week, for 10 weeks; Saturdays from 9 to 11 a. m., during the first semester.

Uhlenhuth.

## FOR GRADUATES

**Anat. 201. General Anatomy of the Human Body (8).** Same course as 101, but on a more advanced level. It can be taken by graduates as well as postgraduate students.

Uhlenhuth, Krah1.

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\* In the Departments of Anatomy, Bacteriology, Biochemistry, and Pharmacology, courses listed under "For Graduates and Advanced Undergraduates" and numbered with 100 are credited for graduate work only when taken to satisfy credits in the minors.

- Anat. 202. Osteology of the Human Skull (1).** Same course as 102, but on a more advanced level. Uhlenhuth.
- Anat. 203. The Peripheral Nervous System (1).** Same course as 103, but on a more advanced level. Uhlenhuth.
- Anat. 204. The Anatomy of the Human Pelvis (2).** Total number of hours, 60; 15 periods of four hours each, every Tuesday morning from 9 a. m. to 1 p. m., for 15 week during the first semester. This course is open to graduate students and postgraduate students specializing in Gynecology, Obstetrics and Urology. Uhlenhuth.
- Anat. 205. Fetal and Infant Anatomy (2).** Total number of hours, 45; 15 periods of three hours each, every Thursday from 9 a. m. to 12 noon for 15 weeks during the second semester. This course is open to graduate students and postgraduate students interested in pediatrics. Krahll.
- Anat. 206. Research in Anatomy.** Maximum credits, 12 per semester. Research work may be taken in any one of the branches which form the subject of anatomy and with either of the instructors listed below. Uhlenhuth, Krahll.

### B. Histology, Embryology and Neuro-Anatomy

Professor Figge; Associate Professors Harne, Lutz; Instructors Mack, Manganiello, Turner, Wolfe; Research Associate Brunst.

The graduate degrees offered by the Department of Histology, Embryology and Neuro-Anatomy are the Master of Science and the Doctor of Philosophy.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Hist. 101. Mammalian Histology (6).** Total number of hours, 144. Four lectures and eight laboratory hours, four times a week for 12 weeks during the first semester. Figge, Harne, Lutz, Mack, Wolfe, Brunst.
- Hist. 102. Human Neuro-Anatomy (4).** Total number of hours, 96. Two lectures and four laboratory hours per week for 16 weeks of the second semester of every medical school year. Prerequisite, Hist. 101, or equivalent. Figge, Harne, Lutz, Mack, Manganiello, Turner, Wolfe.

#### FOR GRADUATES

- Hist. 201. Mammalian Histology (6).** Same Course as Hist. 101, but with additional work of a more advanced nature. Figge, Mack.
- Hist. 202. Human Neuro-Anatomy (4).** Same course as Hist. 102, but with additional work of a more advanced nature. Prerequisite, Hist. 101 and 201. Figge, Manganiello.
- Hist. 203. Normal and Atypical Growth, Lectures in Problems of Growth (1).** One hour per week, time to be arranged. Sixteen weeks, second semester. Figge.

- Hist. 204. Research.** Maximum credits, 12. Research work may be taken in any one of the branches which form the subject of anatomy (including cancer research). Figge.

### BACTERIOLOGY

Professor Hachtel; Associate Professor Steers; Assistant Professor Smith; Instructor Snyder; Associate Levin.

Graduate degrees offered by the Department of Bacteriology are Master of Science and Doctor of Philosophy.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bact. 101. General Bacteriology (6).** Two lectures and eight laboratory hours per week for sixteen weeks, first semester.  
Hachtel, Steers, Smith, Snyder, Levin, Pruitt.
- Bact. 102. Immunology (4).** One lecture and six laboratory hours per week, second semester. Hachtel, Steers, Smith, Snyder, Levin, Pruitt.

#### FOR GRADUATES

- Bact. 201. General Bacteriology (6).** Same course as Bact. 101, but with additional work at a more advanced level. Hachtel, Steers.
- Bact. 202. Immunology (4).** Same course as Bact. 102, but with additional work at a more advanced level. Hachtel, Steers.
- Bact. 203. Bacterial Physiology (3).** Three lectures per week, but no laboratory, first semester. Steers.
- Bact. 204. Research.** Maximum credits, 12. Hachtel, Steers.

### BIOLOGICAL CHEMISTRY

Professor Schmidt; Assistant Professors Herbst, Vanderlinde; Lecturer Summerson; Instructor Brown.

Graduate degrees offered by the Department of Biological Chemistry are the Master of Science and Doctor of Philosophy.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Biochem. 101. Principles of Biochemistry (8).** Seven lectures and conferences and two three-hour laboratory periods a week, second semester. Prerequisites, inorganic and quantitative or physical chemistry.  
Schmidt, Herbst, Vanderlinde, Brown.

#### FOR GRADUATES

- Biochem. 201. Principles of Biochemistry (8).** Same course as Biochem. 101, but on a more advanced level. Schmidt, Herbst, Vanderlinde.

- Biochem. 202. Special Topics in Biochemistry (1, 1). Prerequisite, Biochem. 101 or 201. Schmidt.
- Biochem. 203. Research. Maximum credits, 12. Credit proportioned to extent and quality of work accomplished. Schmidt, Herbst, Vanderlinde.
- Biochem. 204, 205. Seminar (1, 1). First and second semesters. Schmidt.
- Biochem. 206, 207. Cellular Metabolism (1, 1). First and second semesters. Herbst.
- Biochem. 208. Biochemical Preparations (1-4). Credit according to work done. Schmidt.
- Biochem. 209. Chemistry and Metabolic Effects of the Steroid Hormones (2). Vanderlinde.

FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

Instructors Summerson, Jandorf, Michel, Schaffer, Wagner-Jauregg.

Graduate degrees offered at the Army Chemical Center are the Master of Science and Doctor of Philosophy.

- Biochem. 221, 223. Principles of Biochemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, undergraduate courses in inorganic, organic, and quantitative or physical chemistry. Summerson.
- Biochem. 222, 224. Experimental Biochemistry (2, 2). One lecture and one three-hour laboratory period a week, first and second semesters. Prerequisite, Biochemistry 221 and 223, which may be taken concurrently, or equivalent preliminary training in biochemistry. Summerson, Jandorf, Michel, Schaffer.
- Biochem. 225. Chemistry of Amino Acids and Proteins (2). Two lectures a week, first semester. Prerequisite, Biochemistry 221 and 223, or adequate undergraduate training in organic chemistry, with the consent of the instructor. Summerson.
- Biochem. 226. Chemistry of Chemotherapeutic Compounds (1). One lecture a week, first semester. Prerequisite, adequate knowledge of organic chemistry. Wagner-Jauregg.
- Biochem. 227. Enzyme Chemistry (2). Two lectures a week, second semester. Prerequisites, Biochemistry 225 (Protein Chemistry), or equivalent training in biochemistry, with consent of instructor. Jandorf.
- Biochem. 228. Seminar (3). Summerson.
- Biochem. 229. Research. Maximum credits, 12. Credit according to extent and quality of work accomplished. Sumerson, Jandorf.

## PHARMACOLOGY

Professor Krantz; Associate Professor Carr; Assistant Professor Burgison;  
Instructor Musser; Lecturer Marrazzi.

All students majoring in pharmacology with a view to obtaining the degree of Master of Science or Doctor of Philosophy should secure special training in anatomy, mammalian physiology, organic chemistry, and physical chemistry.

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Pharm. 101, f.s. General Pharmacology (8).** Three lectures and one laboratory. This course consists of 90 lectures and 30 laboratory periods of three hours each, offered each year.

Krantz, Carr, Burgison, Musser, Bird, Marrazzi, Harne.

## FOR GRADUATES

**Pharm. 201, f.s. General Pharmacology (8).** Same as 101, for students majoring in pharmacology. Additional instruction and collateral reading are required.

Krantz, Carr, Burgison.

**Pharm. 202. Chemotherapy.** Maximum credits, 3. Credit in accordance with the amount of work accomplished, first semester.

Burgison.

**Pharm. 204. Carbohydrate Metabolism.** Maximum credits, 4. Credit in accordance with the amount of work accomplished.

Krantz, Carr.

**Pharm. 205. Research.** Maximum credits, 12. Credit in accordance with the amount of work accomplished.

Krantz, Carr.

**Pharm. 206. Anesthesia.** Maximum credits, 2. Credit in accordance with the work accomplished.

Krantz, Carr.

## FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

Instructors Marrazzi, Hart, Wills, Horton.

Graduate degrees offered at the Army Chemical Center are the Master of Science and Doctor of Philosophy.

**Pharm. 220, 222. Principles of Pharmacology (3,3).** Three lectures a week, first and second semesters. Prerequisites, Biochemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 221 and 223 except by special arrangement with the instructor.

Marrazzi, Hart, Wills.

**Pharm. 221, 223. Experimental Pharmacology (1,1).** One three-hour laboratory period a week, first and second semesters. Prerequisites, Biochemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 220 and 222 except by special arrangement with the instructor.

Marrazzi, Hart, Wills.

**Pharm. 225. Biometric Principles and Their Application (1).** One lecture a week, first semester.

Horton, Wills.

- Pharm. 226. Electropharmacology. Maximum credits, 2. Time to be arranged. Marrazzi, Hart.
- Pharm. 228. Seminar (1). Hart, Wills.
- Pharm. 229. Research. Maximum credits, 12. Marrazzi, Wills.

### PHYSIOLOGY

Professors Amberson, Smith; Assistant Professors Ferguson, Turner;  
Lecturer Himwich.

The Department prefers to accept students who have already had some graduate training elsewhere. Before admission to candidacy for the Doctor of Philosophy degree the Department gives a qualifying examination, both oral and written, which must be satisfactorily passed.

In the usual case a student majoring in Physiology will be expected to take Pysiol. 101 and 102 before, or concurrently with, courses 201 to 205 below. Such a student will extend his major program by taking courses in other departments of this University, and by enrolling in the summer course in physiology at the Marine Biological Laboratory, Woods Hole, Massachusetts.

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Physiol. 101. Neurophysiology (2). Two lectures a week, for 15 weeks; second semester. Amberson and Staff.
- Physiol. 102. The Principles of Physiology (7). Four lectures, one conference a week, for 15 weeks; 25 four-hour laboratory periods; first semester. Amberson and Staff.

#### FOR GRADUATES

- Physiol. 201. Experimental Mammalian Physiology. Time and credit by arrangement. Amberson and Staff.
- Physiol. 202. Blood and Tissue Proteins (2). Two lectures a week, for 15 weeks.
- Physiol. 203. Physiology of Reproduction (2). Two hours a week, lectures, conferences and seminars, for 15 weeks. Smith.
- Physiol. 204. Physiological Techniques. Time and credit by arrangement. Amberson and Staff.
- Physiol. 205. Seminar. Credit according to work done. Smith and Staff.
- Physiol. 206. Research. By arrangement with the head of the department. Staff.

#### FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

- Physiol. 221, 223. Principles of Physiology (3, 3). Three lectures and conferences, first and second semesters. Prerequisites, Biochem. 221-4, or equivalent. Himwich and Staff.



**Physiol. 222, 224. Experimental Physiology (1, 1).** One three-hour laboratory a week, first and second semesters. Prerequisites, **Physiol. 221-3**, which may be taken concurrently, or equivalent preliminary training in physiology. Himwich and Staff.

**Physiol. 225. Seminar (1).** Himwich and Staff.

**Physiol. 226. Research.** Maximum credits, 12. Credit according to extent and quality of work accomplished. Himwich and Staff.

## SCHOOL OF PHARMACY

Professors Chapman, Cole, Foss, Hager, Phillips, Purdum, Richeson, Wolf; Associate Professors Estabrook, Slama, Shay; Assistant Professors Allen, Ballman, Miller; Instructors Applegarth, Gittinger, Schradieck, Stahl.

## BACTERIOLOGY

This Department offers work leading toward the Master of Science and the Doctor of Philosophy degrees. Requirements for the doctoral degree are fulfilled by supplementing the courses offered in this Department with selected courses from the College Park curriculum.

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Bact. 115. Serology and Immunology (4).** Third year, two lectures and two laboratory periods a week, second semester. Shay, Joseph.

### FOR GRADUATES

**Bact. 200, 201. Chemotherapy (1-2).** One lecture a week. Offered in alternate years. Shay.

**Bact. 202, 203. Reagents and Media (1, 1).** One lecture a week. Offered in alternate years. Shay.

**Bact. 210. Special Problems in Bacteriology.** Laboratory course. Credit determined by amount and quality of work performed. Shay.

**Bact. 211. Public Health (1-2).** One lecture a week. Prerequisites, **Bacteriology 1, 115.** Shay.

**Bact. 221. Research in Bacteriology.** Credit determined by amount and quality of work performed. Shay.

## BIOCHEMISTRY

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 151. Biochemistry (5).** Four lectures and conferences and one four-hour laboratory period a week, first semester. Prerequisites, **Chem. 35, 36, 37, 38, 15.** Schmidt and Staff.

**BOTANY AND PHARMACOGNOSY****FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- Bot. 101, 102. **Taxonomy of the Higher Plants (2, 2).** One lecture and one laboratory period a week. Prerequisites, Botany 1, 21. Given in alternate years. Slama.
- Bot. 111, 113. **Plant Anatomy (2, 2).** Two lectures a week. Prerequisites, Bot. 1, 21, 22. Slama.
- Bot. 112, 114. **Plant Anatomy (2, 2).** Two laboratory periods a week. Prerequisites, Bot. 111, 113. Slama.

**FOR GRADUATES**

- Pharmacognosy 201, 202. **Advanced Study of Vegetable Powders (4, 4).** Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Given in alternate years. Slama.
- Pharmacognosy 211, 212. **Advanced Pharmacognosy (4, 4).** Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Slama.
- Pharmacognosy 220. **Research.** Credit according to amount and quality of work performed. Slama.

**MATHEMATICS**

- Math. 152, 153. **Mathematical Statistics (2, 2).** Prerequisites, Math. 20, 21. Richeson.

**PHARMACEUTICAL CHEMISTRY****FOR GRADUATES AND ADVANCED UNDERGRADUATES**

- Pharm. Chem. 111, 113. **Chemistry of Medicinal Products (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Chem. 35, 37, 53. Hager.
- Pharm. Chem. 112, 114. **Chemistry of Medicinal Products (2, 2).** Two laboratory periods a week, either or both semesters. Prerequisites, Pharm. Chem. 111, 113, or may be taken simultaneously with Pharm. Chem. 111, 113. Hager.
- Chem. 142, 144. **Advanced Organic Laboratory (2, 2).** Two laboratory periods a week, any one or both semesters. Prerequisites, Chem. 19 or 23, and Chem. 37, 38. Miller.
- Chem. 146, 148. **Identification of Organic Compounds (2, 2).** One lecture and two laboratory periods a week, any one or both semesters. Prerequisites, Pharm. Chem. 111, 113, or Chem. 141, 143. Miller.

**FOR GRADUATES**

- Pharm. Chem. 201, 203. **Survey of Pharmaceutical Chemistry (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Hager.

- Pharm. Chem. 211, 213. Chemistry of the Alkaloids (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Hager.
- Pharm. Chem. 220. Advanced Pharmaceutical Syntheses (2-6).** Laboratory and conferences, either or both semesters. Prerequisites, Chem. 142, 144, or Pharm. Chem. 112, 114. Hager.
- Pharm. Chem. 222. Advanced Pharmaceutical Analyses (1-4).** Laboratory and conferences, either or both semesters. Prerequisites, Chem. 146, 148. Hager.
- Pharm. Chem. 230. Pharmaceutical Chemistry Seminar (1).** Required of students majoring in pharmaceutical chemistry each semester. Hager.
- Pharm. Chem. 235. Research in Pharmaceutical Chemistry.** Credit determined by amount and quality of work performed. Hager and Staff.
- Chem. 258. The Identification of Organic Compounds.** An advanced course. Two to four laboratory periods a week, either semester. Prerequisites, Chem. 146, 148, or equivalent. Miller.

### PHARMACOLOGY

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Pharmacology 111. Official Methods of Biological Assay (4).** Two lectures and two laboratory periods a week, first semester. Prerequisite, Pharmacology 51, 52. Chapman.

#### FOR GRADUATES

- Pharmacology 201, 202. Methods in Biological Assay (4, 4).** Two lectures and two laboratory periods a week, first and second semesters. Prerequisite, Pharmacology 111. Offered in alternate years. Chapman.
- Pharmacology 211, 212. Special Studies in Pharmacodynamics (4, 4).** Two lectures and two laboratory periods a week, first and second semesters. Prerequisites, Pharmacology 51 and 52 and the approval of the instructor. Chapman.
- Pharmacology 221, 222. Special Studies in Biological Assay Methods (2-4, 2-4).** Credit according to amount of work undertaken after consultation with the instructor. Laboratory work and conferences, first and second semesters. Prerequisites, Pharmacology 111, 201, 202. Offered in alternate years. Chapman.
- Pharmacology 250. Research in Pharmacology.** Properly qualified students may arrange semester hours' credit with the instructor. Chapman.

### PHARMACY

#### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Pharmacy 101, 102. (3, 3).** Two lectures and one laboratory a week. Prerequisites, Pharmacy 51, 52 and consent of the instructor. Allen, Balassone.

- Pharmacy 205. Manufacturing Pharmacy Control (3). Foss.
- Pharmacy 111, 112. Advanced Prescription Compounding (3, 3). Two laboratory periods a week. Prerequisites, Pharmacy 51, 52. Allen, Kahn.
- Pharmacy 120. Hospital Management (2). Two lectures a week. Prerequisites, Pharmacy 51, 52. Purdum.

## FOR GRADUATES

- Pharmacy 201, 202. Advanced Pharmaceutical Technology (4, 4). Two lectures and two laboratory periods a week. Prerequisites, Pharmacy 101, 102. Foss, Purdum, Allen.
- Pharmacy 205. Manufacturing Pharmacy Control (3). Foss.
- Pharmacy 211, 212. Survey of Pharmaceutical Literature (1, 1). One lecture a week. Prerequisite, Pharmacy 51, 52 and 61. Purdum.
- Pharmacy 221, 222. History of Pharmacy (2, 2). Two lectures a week. Given in alternate years. Prerequisite, Pharmacy 61. Purdum.
- Pharmacy 230. Pharmacy Seminar (1). Each semester. Foss, Purdum.
- Pharmacy 235. Research in Pharmacy. Credit and hours to be arranged. Foss, Purdum.

## PHYSICS AND PHYSICAL CHEMISTRY

## FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 187, 189. Physical Chemistry (3, 3). Three lectures a week, first and second semesters. Prerequisites, Phys. 11; Chem. 15, 35, 37. Estabrook.
- Chem. 188, 190. Physical Chemistry (2, 2). Two laboratory periods a week, first and second semesters. Prerequisite, Chem. 187, 189, or may be taken simultaneously with these courses. Estabrook.
- Phys. 104, 105. Electricity and Magnetism (3, 3). Two lectures and one laboratory period a week, first and second semesters. Given in alternate years. Prerequisites, Phys. 11; Math. 21. Estabrook.

## FOR GRADUATES

- Phys. 200, 201. Introduction to Theoretical Physics (5, 5). Five lectures a week, first and second semesters. Given according to demand. Estabrook.
- Phys. 208, 209. Thermodynamics (2, 2). Two lectures a week, first and second semesters. Prerequisites, Phys. Chem. 187, 189, 188, 190. Given in alternate years. Estabrook.

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